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THE UNIVERSITY OF ALBERTA

PLANNING AND DEVELOPMENT OF PEDESTRIAN FACILITIES IN THE CENTRAL AREA OF EDMONTON

BY

SHUGUANG WANG

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF ARTS

DEPARTMENT OF GEOGRAPHY
EDMONTON, ALBERTA
FALL 1988

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THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommended to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled PLANNING AND DEVELOPMENT OF PEDESTRIAN FACILITIES IN THE CENTRAL AREA OF EDMONTON submitted by SHUGUANG WANG in partial fulfilment of the requirements for the degree of MASTER OF ARTS.

(Supervisor)

Date: October 7, 1988

Abstract

Urban central areas usually have high concentrations of those activities that need face-to-face contacts and have greatest pedestrian generation effects. Thus, pedestrian circulation is vital to all city centres. Nowadays, most downtown plans call for special pedestrian amenities, such as pedestrian malls, pedways, plazas, and arcades. This is also true of Edmonton's central area.

There are generally two forces for pedestrian facility development; one is objective demand, which is generated by particular land use structures; the other is conscious planning, which should, in theory, be the policy response to objective demand, or to changes of objective demand. Pedestrian facility development can therefore be thought of as the physical outcome of the dynamic process of interaction between these two forces.

This thesis is to focus upon the development of pedestrian facilities in the central area of Edmonton. The research was designed to determine, first, how well planning policies have responded to shifts in objective demand caused by land use changes, and, second, the relative effects of the two forces on the actual development of special pedestrian facilities.

The thesis study found that during the past twenty years, the floor space for those activities that have the greatest pedestrian generation effects in central Edmonton increased significantly. The objective demand for pedestrian facilities was therefore greatly intensified. The planning and development of pedestrian facilities have been closely associated with the intensification and spatial shift of objective demand.

However, Edmonton's experience indicates that the association of pedestrian facility development with land use change events and the planning policy adjustments has not been a simple linear one. First, plans have not always reflected changes of objective demand very well. Thus, there were often time lags between the change of objective demand and policy formulation. Second, planning for pedestrian facilities has been regarded as a public initiative for the revitalization of the central area of Edmonton by means of attracting more people, and

people-oriented businesses, to the central area. This can enhance objective demand for the provision of facilities.

It is also concluded that the development of pedestrian facilities in central Edmonton is not solely the outcome of objective demand and conscious planning. Other actors also contributed to this development, such as politicians and developers, who had their own perceptions of needs and priorities.

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Chapter 1 Introduction

1.1 Justification for the Study

Every city in North America has a centre, or central area, which is usually the oldest part of the city. Although most of these city centres have experienced extensive changes, both physically and economically (such as horizontal and vertical expansion, and population decentralization), something historical and traditional in them has always survived. For example, most centres in North American cities were initially built and developed as centres of business, finance, and retailing. Today, these functions still dominate over other land uses in the centre.

According to Zimmerman, "The city is an expression of man's need to come together with his fellows. The first cities very likely had their beginnings simply as places where human beings could easily - and safely - congregate. Millennia later, the ability to serve the pedestrian is still at the heart of the city's function, although in the last decades, many governments have acted as though that function was to make room for the automobile" (Zimmerman, 1974, p46). This is especially true in the city's central area because most businesses, financial services, and retailing concentrate there, and need more face-to-face contacts than other activities. Even in city centres designed in the motor age (such as Edmonton's central area), every trip by car, bus, or subway begins or ends with a walk. Thus, pedestrian circulation is vital to all city centres. Yet, for a long time, pedestrian facilities were a forgotten element in traffic engineering and urban design. The inability of many central areas to serve the pedestrian safely and efficiently was an important cause of their decline. It was not until the late 1950s that some North American cities began to give serious consideration to the improvement of pedestrian movement and the provision of different kinds of pedestrian facilities. Nowadays, almost "every downtown plan recognizes the role of the pedestrian and the importance of pedestrian activities. Most plans call for special amenities, such as pedestrian malls, underpasses, plazas, and arcades" (Morris and Zisman, 1962, p152).

Pedestrian facility systems in the central areas of individual cities can take various forms. For example, the pedestrian facility systems in the central areas of Calgary and Minneapolis are largely skyway systems; the systems in Montreal and Toronto are mostly underground; while the system in Edmonton's central area is a combination of walkways at three levels. Why these pedestrian facility systems take their specific forms, and how well they serve the pedestrians in their city centres, are questions that have caught the interest of many urban planners and geographers. As yet, however, there has been no comprehensive study of pedestrian facility development in Edmonton's central area. This study will attempt to fill that gap. The study period 1966-1987 was chosen because it was not until 1966 that the draft version of the first-ever **Edmonton General Plan** articulated the first official recognition of the importance of developing connected and climate-controlled pedestrian facilities in Edmonton's central area. It is hoped that the thesis will provide useful findings for the future planning of pedestrian facilities in Edmonton's central area, and offer some experience for other cities to refer to when they plan their own pedestrian facility systems.

1.2 Terminology

Before going further into the substance of this study, it is necessary to distinguish some terms which will be used in this thesis but which may cause confusion.

In the literature of urban studies, it is common for various terms—such as "heart of the city", "downtown", and "central business district"—to be used interchangeably with "city centre" and "central area" to represent essentially the same area. To clarify the distinctions among these terms is not easy because they have already been used in confusing and overlapping ways, even in the professional and academic literature. As Horwood and Boyce (1959, p9) stated: "In the field of urban studies, the lack of uniformly accepted definitions is most apparent when the central area of the city is considered."

For example, Horwood and Boyce themselves used the term central business district (CBD) in the sense of the whole central area of the city, whereas Murphy and Vance (1955) used the same term to represent a much smaller area which is only part of the central area. It is therefore necessary to try to clarify my understanding of these terms, and explain how they will be used in this thesis.

The terms "city centre" and "central area" both refer to the geographical centre of a city. They give a clear indication of location, but not of land use or functional role. Both terms have been widely used in urban geography, though "central area" is preferable. Literally, the word "centre" implies a point, whereas "area" denotes a particular extent of space.

The term "downtown", which, according to the Longman Dictionary of Contemporary English, refers to "the business centre of a town or city", both indicates the location of the area and has the implication of businesses as the main function. But it is a popular term, which is loosely used and lacks academic acceptance. So, too, is "heart of the city", although it is a metaphor that seems to appeal to boosters and politicians. For example, the Mayor of Edmonton in 1983 appointed a blue-ribbon task force to recommend physical improvements for central Edmonton. In its final report, the task force used the term "the heart of the city" to refer to the central area of Edmonton.

"Central business district" (CBD), which also has a clear implication of business land uses, has a distinct meaning from all the above terms. Although the term was used long before Murphy and Vance's noted study (see Horwood and Boyce, 1959), it was Murphy and Vance (1955) who for the first time developed a standard method of delimiting CBD boundaries through measurable indices. Since then, these indices have been widely used by urban geographers and other researchers. To Murphy and Vance, the CBD is only one part of the central area of the city, and so refers to a smaller area. It is therefore improper to use the term CBD interchangeably with the others discussed here. Even the popular terms, "downtown" and "heart of the city", are commonly used to refer to areas larger than the central business district, strictly defined. In the core-frame concept of

Horwood and Boyce, the CBD is also called the "core area" (of which more will be said in Chapter 3).

Another term used in this thesis is "civic centre". What is the difference between a city centre and a civic centre, then? According to Breines and Dean (1974), the civic centre is the "heart" of a community, a place to advance public convenience and government visibility. It serves as a meeting place, where city officials can discuss common concerns with community members and seek to formulate common responses. A civic centre might also be planned around a vehicle-free public open space, commonly in the form of a square, which would provide the community with a focus. Citizens, often arriving by subway or bus, would find all the government agencies serving their community within easy walking distance. From this description, it can be seen that a civic centre is a spatial cluster of civic and government functions, located in the central area of the community (or city). But it is apparently separated in space from the CBD as defined by Murphy and Vance, and like it is only part of the central area. This is also true of Edmonton's civic centre, which is only one part of central Edmonton. Therefore, "civic centre" should not be used in the same sense as "city centre" and "central area", and it has the least similarity with any of the other terms described here.

In this thesis, the above terms will be divided into two groups which are not used interchangeably: one includes city centre, central area, downtown, and the heart of the city, which are used as synonyms, unless particularly specified; the other includes CBD and core area, which will be used only with the particular meaning defined by Murphy and Vance.

The term central area is used in the title of the thesis because it has been widely accepted as an academic term in urban literature. Downtown and heart of the city are also retained because they have been used in local planning documents which will be cited in this thesis.

1.3 Statement of Research Problem and Purpose of the Thesis

In the geography of urban transportation, it is well recognized that there are two factors which govern general travel flow patterns in North American cities: one is the function or structure of a particular city; the other is the strategy used by local planners in developing their transportation systems (Barber, 1986). For example, each type of land use in a city can be regarded as a traffic generator. Different land use types that constitute the particular physical and functional structure of the city have distinct traffic-generating effects. Therefore, the particular functional structure will determine the amount of traffic generated in the city. The highway systems which are consciously planned and developed to connect origins and destinations in the city will determine the flow of traffic along routes. The same two factors also govern general pedestrian flow patterns in the central area of a city. There, the different land use types can be viewed as pedestrian trip generators with distinct pedestrian generation effects, while pedestrian facilities that are consciously planned and developed in the city centre to connect pedestrian generators will direct pedestrians flows.

Thus, in both cases, particular land use structures generate objective demand for physical facilities to assist traffic or pedestrian flows. Physical facilities are consciously planned and developed to meet the objective demand and to minimize the impediment between origins and destinations. In this sense, there are two forces for the development of pedestrian facilities: one is objective demand, which is generated by land use types; the other is conscious planning, which should, in theory, be the policy response to objective demand. Pedestrian facility development can therefore be thought of as the physical outcome of the dynamic process of the interaction between these two forces. Ideally, if conscious planning is well adapted to objective demand, the relationship will be a balanced one. In practice, balance is difficult to achieve. Many actors are involved in the decisions to build pedestrian facilities—planners, politicians, developers and diverse interest groups, all with their own perception of needs and priorities. Objective demand is constantly changing as well, so that plans may become outdated before they have been fully implemented. For that matter, even if plans are well adapted to changing demands, there is no guarantee that the planned facilities will actually be built.

Given this context, the thesis is focused upon the development of pedestrian facilities in the central area of Edmonton as an outcome of the dynamic relationship between the two forces of objective demand and conscious planning. The research was designed to try to determine, first, how well planning policies have responded to shifts in objective demand caused by land use changes, and, second, the relative effects of the two forces on the actual development of special pedestrian facilities.

To approach the first force, objective demand, an understanding of the physical structure of, and the general trend of land use change in, Edmonton's central area is needed. This is because the various land use types are also pedestrian generators, and land use changes cause changes in the intensity and spatial pattern of the objective demand for pedestrian facilities. Furthermore, since different land use organizations generate distinct patterns of objective demand, the central area of Edmonton will be divided into functional areas, distinguished by their basic activities, such as retailing, government offices, civic functions, and housing. This will facilitate the interpretation of the relationship between the spatial placement of pedestrian facilities and land use patterns. To better implement the comparison of functional areas, a rank of activities in terms of pedestrian generation effects will also be developed.

To examine the second force, that is conscious planning, a comprehensive investigation of the evolution of the planning policies with regard to pedestrian facility development in Edmonton's central area is imperative. By means of such an investigation, it is possible to reveal how well the planning policies were adapted to the changes in objective demand.

Because land use change and pedestrian facility development are sequential, they will be analysed in five-year periods. By this means, the association of pedestrian facility development with major land use change events and policy adjustments can be better reflected and interpreted.

The functions of pedestrian facilities range from the pure facilitation of pedestrian movement to the provision of various amenities for the convenience and pleasure of pedestrians. Correspondingly, the facilities themselves take different physical forms. For example, some of them assume the form of grade-separated pedways. Others take the form of pedestrian malls. There are still others which appear as parks or plazas. Whatever forms individual facilities take, it is only when they form a system that they can serve the central area effectively. Therefore, the relationship and connection among individual facilities in the central area of Edmonton will also be investigated.

It is important, as well, to remember that Edmonton is a winter city. (According to Rogers and Hanson [1980], a winter city is one where the average January temperature is 0°C or colder.) The severe winter climate is a very important factor in the development of a comprehensive downtown pedestrian circulation system. The provision of weather-protected or climate-controlled pedestrian facilities is therefore both necessary and significant. This study will investigate how much has been done since the late 1960s to meet this need.

During the past two decades, many special pedestrian facilities have been built in the central area of Edmonton, such as the underground pedways from the library parkade to City Hall and the Provincial Law Court; the skywalks linking Edmonton Centre with Eaton's department store, Manulife Building and Canada Trust Tower; and the improved sidewalks on Jasper Avenue and Rice-Howard Way. It is noteworthy, however, that a complete, integrated network has not been achieved yet. To mention just one example, the 102nd Street Mall which has been under consideration since 1962 has still not been started. The thesis will therefore address the problems the City of Edmonton has encountered in its efforts to develop a pedestrian circulation system for its central area.

In general, the research will determine what kinds of pedestrian facilities have been developed in Edmonton's central area during the past twenty years; where, when, and why they were built; and how well this development was integrated into the dynamic process of the two interrelated forces: objective demand and conscious planning.

1.4 Study Area

The central area of Edmonton is a somewhat arbitrarily defined urban space. In one previous academic study of importance to this thesis, Bannon (1967) defined the central area to extend from 95th Street on the east to 112th Street on the west, and from the river bank on the south to 106th Avenue on the north, with two antennae along 101st Street to the north and Jasper Avenue to the west (Figure 1-1). Then, in Edmonton's first general plan (Edmonton, 1972), an even larger area was included, extending from Groat Ravine in the west to Kinnaird Ravine in the east (Figure 1-2). In recent years, the term "downtown" has replaced "central area" in municipal plans, and the areal scope has been greatly reduced. Thus, in the Downtown Area Redevelopment Plan Bylaw (Edmonton, 1981), the following boundaries were adopted (in a clockwise direction): starting at 97th Avenue, north along the western boundary of the C.P.R. railway lands and 111th Street; east along the northern boundary of the C.N.R. railway lands; south along 97th Street; west along the top of the river bank, Macdonald Drive, Bellamy Hill Road, and further west along the river valley road, including the Legislature Grounds, to the point of commencement at the C.P.R. railway lands (Figure 1-3).

The study area for thesis purposes closely resembles that of the downtown plan but has its own characteristics. The boundaries are as follows (Figure 1-4): the C.P.R. railway yard (109th Street) to the west, the C.N.R. railway yard (104th Avenue) to the north, the 96th Street to the east, and the top of the river valley to the south. The delineation of this area is based on three considerations:

(1) The railway yards and the top of the river valley form obvious physical obstacles to downtown pedestrian movement.

(2) The study area mostly coincides with the scope of the downtown pedestrian circulation network, and all existing special pedestrian facilities are within this study area. Therefore, it is

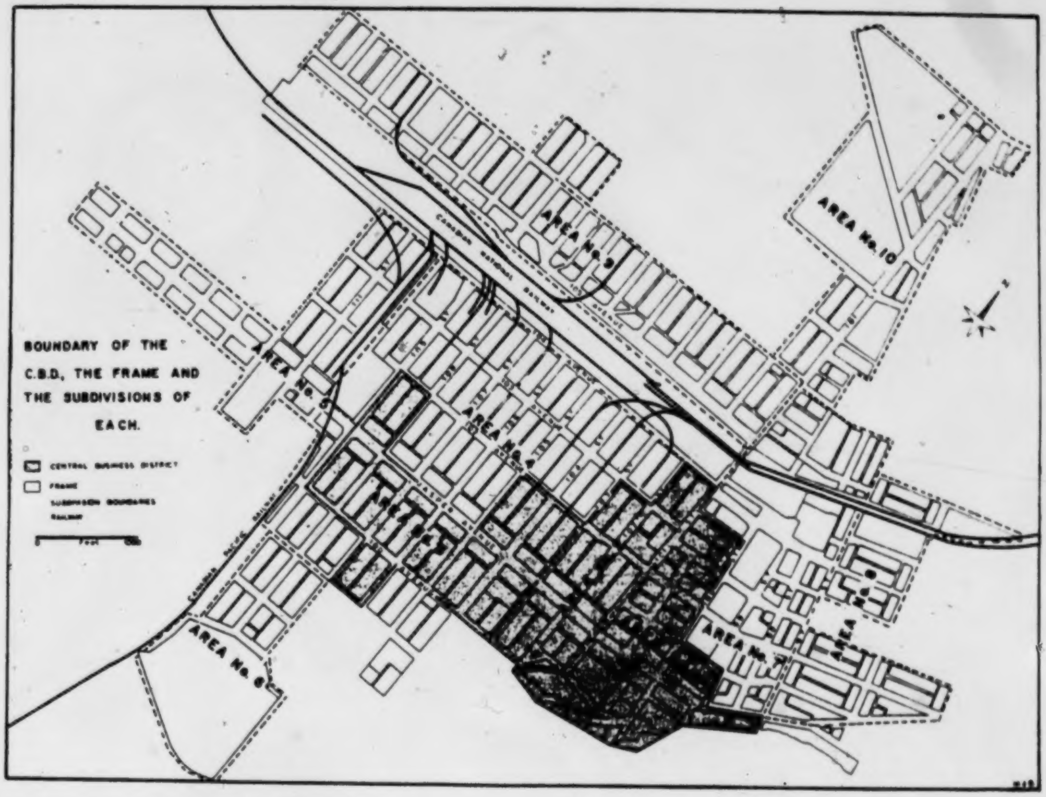

Figure 1-1 The Central Area of Edmonton
Source: Bannon, 1967, Map 2

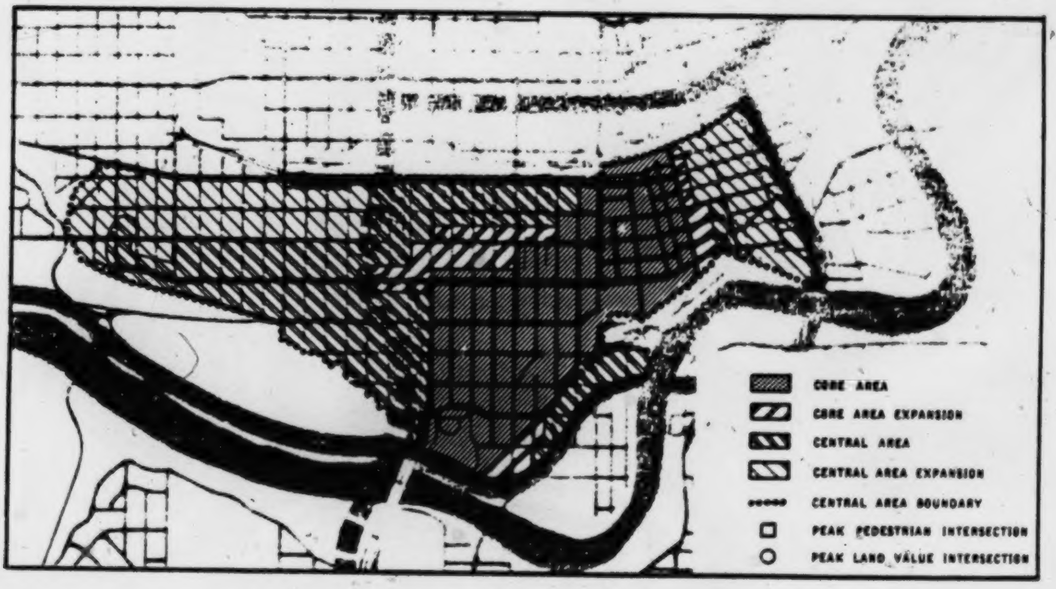

Figure 1-2 The Central Area of Edmonton
Source: Edmonton, 1972, p10.1

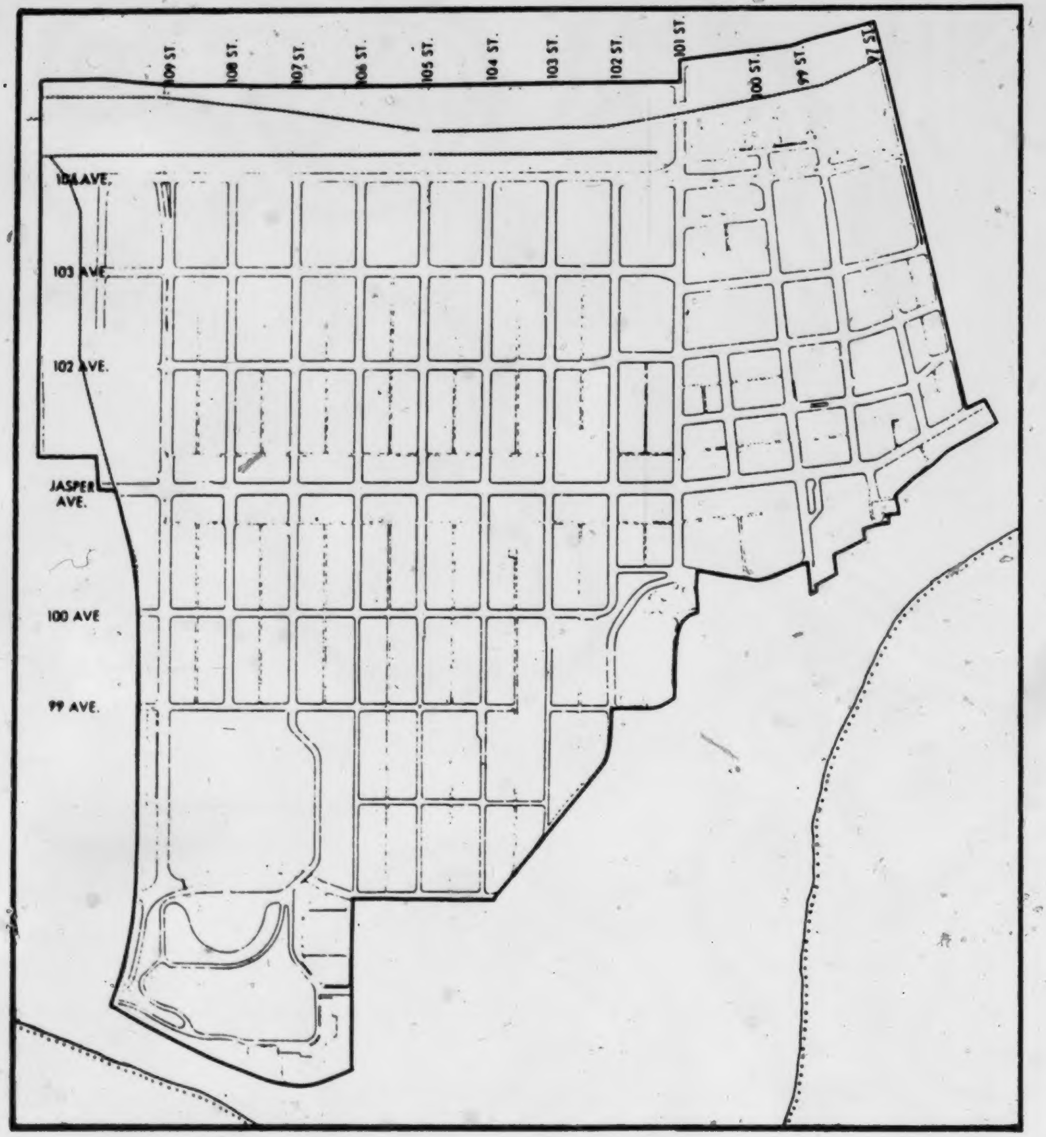

Figure 1-3 Downtown Area of Edmonton
Source: Edmonton, 1981, p5

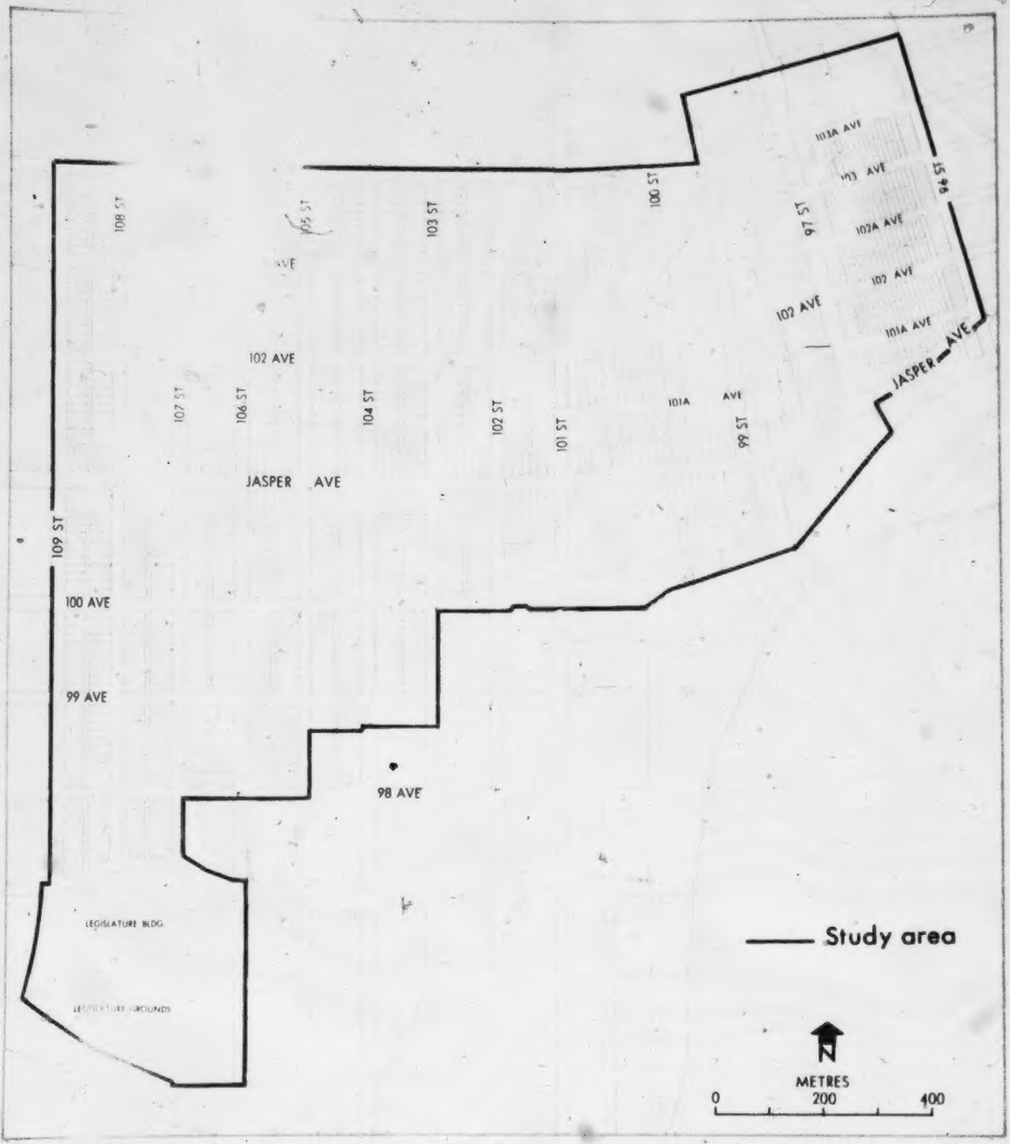

Figure 1-4 Study Area

large enough for a comprehensive examination of the planning and development of special pedestrian facilities in Edmonton's central area.

(3) The portion of the Boyle Street area between 96th and 97th Streets has been facing redevelopment pressure from the expansion of the southeastern and northeastern sectors of the civic centre area; that is, from the construction of the Edmonton Convention Centre and Canada Place to the south, and from the John E. Brownlee Building and the Edmonton Police Headquarters and Remand Centre to the north. There is also a Chinatown redevelopment plan which proposes several projects to attract pedestrians, including the newly-erected Chinatown Gate. It is expected that there will be more exchanges of pedestrians between this part of the Boyle Street area and the civic centre when these projects are completed. For this reason, this part of the Boyle Street area is included in the study area. East of 96th Street is generally a homogeneous residential area which has little attraction for downtown pedestrians.

1.5 Organization of the Thesis

The thesis is designed in six chapters. Following this Introduction is a literature review which constitutes Chapter 2. In this chapter, the physical structure and land use changes of North American city centres are generalized, and a framework for pedestrian facility planning and development in such a context is reviewed. It is a theoretical basis for this study. Chapter 3 describes in detail the data sources and methods employed in the thesis research. Chapter 4 provides an interpretation of land use changes in the central area of Edmonton during the past twenty years, which sets the context in which the substantial development of pedestrian facilities has taken place. Chapter 5 offers a detailed examination of the planning and development of the pedestrian facility system in Edmonton's central area, which is the main theme of this thesis. Finally, Chapter 6 offers the major conclusions of this study and attempts some recommendations for future planning.

Chapter 2 Literature Review

This chapter is a literature review which establishes the theoretical basis for the research design for this thesis. The review was initially guided by the well-established recognition that there are two factors which govern general travel flow patterns in North American cities: one is the function or structure of a particular city, the other is the strategy used by local planners in developing their transport systems (Barber, 1986). The chapter is in three parts. The first part generalizes the physical structure of, and the general trend of land use changes in, the central areas of North American cities. These establish the spatial context within which the planning and development of pedestrian facilities have taken place. Interpretation of the relationship between the placement of pedestrian facilities and land use patterns cannot be done without a good understanding of this context. In the second part of the chapter, the framework for pedestrian facility study is reviewed. The topics of importance here are pedestrian trip generators, pedestrian trip characteristics, the need for pedestrian facilities, pedestrian facility systems, general objectives and principles for pedestrian facility planning, and the impacts of pedestrian facilities on land use changes. The third part is devoted to a conclusion which summarizes what, of importance, I learned from this literature review and how it shaped my ideas about the thesis research.

2.1 Physical Structure and General Land Use Changes of the Central Areas of North American Cities

2.1.1 Physical Structure of the Central Area

The modern urban landscape may appear chaotic, but spatial order lies beneath its infinitely varied surface (Griffin and Preston, 1966). To determine this order constitutes one of the tasks for urban geographers. For example, the spatial distribution of pedestrian facilities in the central area of the city may seem random, but in theory it should be closely related to the arrangement of land uses. Therefore, an understanding of this theoretical order is important to the investigation of pedestrian facility development in relation to land use change.

The central area of the city is not developed at a uniform intensity, but is organized around an exceptionally limited area of very high land value upon which most of the downtown retail and office uses are concentrated. This limited area is generally referred to as the core of the city, or the central business district. Surrounding this core is a relatively large "frame" given over to a variety of business and commercial functions, as well as to institutional and residential uses, often in high density forms.

Although the existence of a city core, defined by its extreme concentration of activities and its high daytime population density, has long been recognized by urban researchers, including Haig, Lewis, Adams, Hoyt, Van Cleef, Rannells, and Murphy and Vance (Horwood and Boyce, 1959), it was Horwood and Boyce who first developed the core-frame concept of the central area (Figure 2-1). In all essential respects, however, Horwood and Boyce's core is the same as Murphy and Vance's CBD. Thus, Murphy and Vance (1954, p203) wrote of the CBD that its "really essential functions appeared to be the retailing of goods and services for a profit, and the performing of various office functions," while Horwood and Boyce (1959, p15) described the core in exactly the same terms: "It is devoted to people, paper work, and parcels. In this area of greatest personnel concentration, the space is used predominantly for offices and retail trade."

Table 2-1 depicts the general characteristics of the core area. This generalization by Horwood and Boyce is highly consistent with that of Murphy and Vance, except that Horwood and Boyce included governmental functions in the core, whereas Murphy and Vance did not.

The frame is a diverse area surrounding the core, and is readily distinguishable from all other parts of the city. It has also been called a transition zone which "possesses neither the advantages of a central business district location nor conditions which are readily adaptable to a widely desirable pattern of residential living" (Griffin and Preston, 1966, p339). The main land use types in the frame are usually such intensive non-retail activities as off-street

This is page 15. The material on this page has been removed because of the unavailability of copyright permission. The material contains Figure 2-1 **Core-Frame Concept**. The original source of the material is Horwood and Boyce, 1959, p21 (see **Bibliography**).

This is page 16. The material on this page has been removed because of the unavailability of copyright permission. The material contains Table 2-1 **General Properties of the Core.** The original source of the material is Horwood and Boyce, 1959, p16 (see **Bibliography**).

parking, warehousing, light manufacturing, wholesaling, special professional services, transportation terminals, and multi-family residences. The general characteristics of the frame are presented in Table 2-2.

Horwood and Boyce (1959) remarked that although both the core and the frame have distinct attributes when viewed within the core-frame concept, it should be remembered that they are really one unit (i.e. the central area or downtown) because of the many linkages between them and the complementary functions they perform for each other.

There are several ways of delimiting the boundary between the core and the frame, including retail sales attraction, land values, and the intensity of central business land use. These different methods will be discussed in Chapter 3.

2.1.2 General Trend of Land Use Changes in the Central Area

The core of the city is highly dynamic. During the past 50 years or so, the most striking phenomenon affecting the core area has been the functional shift (and resultant change in land uses) which Yeates and Garner (1980) have described as "downtown transformation". For instance, most North American cities have experienced a decline in retailing and a parallel boom in office employment in the core area. Before 1920, about 90 percent of total retail sales in the urban area was from downtown outlets, but today the proportion is well below 50 percent in most cities and is still declining. At the same time, manufacturing, wholesaling, and warehousing functions were moving out of the frame. Although office decentralization also occurred, the core area remained resilient for a number of reasons, including access to banking and other financial services, and the desire of city administrations to promote white-collar employment (Ley, 1983). Nowadays, the typical core is dominated by three broad groups of activities: 1) financial services, including banks, lending institutions, insurance companies, brokers and related functions; 2) specialized retailing functions; 3) various other services, including business offices, personal/medical/professional services, and hotels. These activities have squeezed out other functions from the highly

This is page 18. The material on this page has been removed because of the unavailability of copyright permission. The material contains Table 2-2 **General Properties of the Frame**. The original source of the material is Horwood and Boyce, 1959, p20 (see **Bibliography**).

accessible and high-rent core, forcing them to relocate peripherally to create a surrounding frame of mixed, less intensive land use, and making the core functionally more specialized.

Land use change within the core of the central area has been accompanied by considerable redevelopment and vertical expansion. As Yeates and Garner (1980, p335) pointed out: "Walking distances have traditionally been a critical factor in restricting the spread of the core, and great reliance is placed on the elevator for interaction within it, giving rise to the tight cluster of skyscrapers that has become the dominating feature of the skyline of the North American city." Yet, despite the constraint of pedestrian convenience, dynamic core areas tend to expand outward as well, and may even migrate over long periods. Several studies have demonstrated that the margins, or boundaries, of the core area do not move uniformly in all directions, but rather advance along certain fronts and retreat along others. Thus, there are "zones of assimilation" and "zones of discard" (Murphy, Vance, and Epstein, 1955).

In his study of the frame or transition zone, Preston (1968) found that it is composed of three functionally and morphologically different sectors: the sector of active assimilation, the sector of passive assimilation, and the sector of general inactivity (Figure 2-2).

1. The sector of active assimilation is that zone where both the frame and the core are expanding outward vigorously. This sector is the most fashionable part of the zone and is characterized by the largest nucleus of once high-class multi-storey houses located near the central business district, by expanding nodes of government, organizational and charitable institutions, and by commercial establishments along major thoroughfares.

2. The sector of passive assimilation forms that part of the central area where city blocks discarded by the core are being absorbed into the frame. It is generally run-down and contains the "old downtown" with its aged structures, widespread land-use conversion, high vacancy rates, and commercial and residential skid-rows. (In Edmonton's case, the Boyle Street area, east of 97th Street,

This is page 20. The material on this page has been removed because of the unavailability of copyright permission. The material contains Figure 2-2 **Schematic Portrayal of Principal Land-Use Nuclei within the Transition Zone**. The original source of the material is Griffin and Preston, 1966, p347 (see **Bibliography**).

is such a sector.) In recent decades, many North American cities have initiated renewal programs to revitalize this sector of the frame. These plans proposed many projects to reinforce the traditional downtown and re-assimilate it into the core.

3. The sector of general inactivity is the portion of the transition zone experiencing little change relative to other sectors. This sector appears to be dominated by areas of low income housing and by that part of the old central industrial district now occupied by wholesaling, storage, light industry, and transport depots. (In Edmonton, the northwestern part of the central area is an example.)

2.2 Framework for Pedestrian Facility Study

2.2.1 Pedestrian Trip Generators

Each type of land use can be treated as a pedestrian trip generator. Pushkarev and Zupin (1975) stated that at least one end of any trip is generally anchored to a building (which accommodates a certain kind of function). Thus, one can picture all pedestrian travel as emanating from buildings, and these buildings as having trip generation rates; that is, the number of trips a unit of floor space will attract, or generate, in a unit of time. It is also reasonable to expect that particular land use types should have different pedestrian-generating effects (i.e. some uses generate more pedestrian trips than others). Pushkarev and Zupin (1975) found that office buildings produce roughly twice the number of pedestrian trips per unit of floor space as residences, and that restaurants attract ten times as many pedestrian trips per unit area as the same amount of office floor space.

Unfortunately, very few studies dealing with specific generation rates for different land use types have been found. This may be because of time and cost constraints on the observation of pedestrian flows and data collection, or because of other methodological difficulties, such as the availability of escape routes from a survey area. In the literature review, only two relevant studies were found: one was conducted in a shopping centre in Rijswijk, a small city in the Netherlands; the other was done in the central area of Greater London. In Rijswijk, the author found that the generation rates for the shopping centre were, respectively, 25 trips on workingdays and 78 trips on Saturdays, per $100m^2$ of gross floor area (Gantvoort, 1971b). In the central area of London, a more detailed survey was conducted. The final sample adopted consisted of nine stores. Four of the them were department stores, three were chain stores and two were supermarkets selling groceries and household goods. Four of the stores were located in Oxford Street-Piccadilly, an area of relatively high tourist concentration compared with the local office worker population. The other stores were in areas of lower tourist concentration and thus had relatively high local office worker population. For each store, a visitor trip generation rate was calculated in terms of the visitors per week per $100m^2$ of gross floor area. The survey found that the generation rates observed for chain stores and supermarkets were much higher than those for department stores. Smaller and medium-sized chain stores and supermarkets had generation rates of 2,500-3,000 visitors per week per $100m^2$ of gross floor area, while the four department stores surveyed had rates of 330-600 visitors per week per $100m^2$. In addition, within both classes of store types, there was a general tendency for trip generation rates to decrease with increase in store size (Hasell, 1973).

To make the findings of this study consistent with those from Rijswijk, the generation rates observed in the central area of London can be expressed as follows: 416-500 visitors per day per $100m^2$ of gross floor area for chain stores and supermarkets, and 55-100 visitors per day per $100m^2$ of gross floor area for department stores. Apparently, the generation rates of retail stores in the central area of London are higher than in Rijswijk. Two things might contribute to this difference: 1) the survey in London was done in the central area where there is a high concentration of visitors and office employees, whereas the Rijswijk survey was conducted on the periphery of the urban area of the Hague (the total population of Rijswijk was only 48,000); 2) the London survey was done for different classes of store type, while the survey area at Rijwijk was a shopping centre which included one large department store, two variety stores and two supermarkets. As Hasell (1973, p12) pointed out: "A department store [actually Hasell is here referring to a shopping centre] is a number of different stores, or departments, within the same building. Movement between these departments normally takes place internally and is not included in the pedestrian flow recorded at the store entrances."

The chief value of these surveys for the thesis purpose is to establish that pedestrian generation rates differ for different types of retail stores, and at different times of the week. Unfortunately, however, no similar surveys have been identified on other activities, such as financial services, business offices, and governmental/civic functions. Otherwise, a definite ranking of various activities in terms of pedestrian generation rates could have been developed. That would have been very useful for the thesis analysis.

A different approach to the interpretation of pedestrian generation can be seen in the studies of Benepe (1965) and Stuart (1968), who classified all generators as being either primary or secondary. Primary generators are the points of origin of the initial walks in the study area, such as parking facilities, transit terminals, and residential units. Hence, primary generators serve as change-of-mode points for most pedestrian trip-making. In contrast, secondary generators are those destinations of the initial and succeeding walks which then become generators of further pedestrian activity.

In urban central areas, the various pedestrian generators are linked together by different lines or paths. The patterns and intensities of the pedestrian movements generated therefore differ widely, depending on two interdependent variables which are subject to control: land use and the availability of paths.

2.2.2 Pedestrian Trip Characteristics

Pedestrian trip characteristics will be described under three subheadings: trip classification; spatial and temporal distribution of pedestrian trips; and other behaviour of pedestrians.

1) Trip Classification

Various pedestrian trip classifications are described in the literature. Mostly, these classifications have been based on two things: the purpose of the trip and the degree of necessity to perform the trip. The following are two examples.

Morris and Zisman (1962) grouped all trips into four categories according to purposes: (1) terminal trips; (2) use trips; (3) health and pleasure walks; and (4) parades. Terminal trips involve walking to or from a terminal (bus stop, parking lot, etc.). These are the most numerous kinds of trips. Use trips, the second largest category, connect functions, such as an office building with a restaurant or retail store. Health and pleasure walks are casual strolls to enjoy the fresh air and visual offerings enroute; thus, they may start from a certain generator (mostly residences) and lead to any place that is regarded as interesting. The parade is occasional. It happens only for a particular purpose, but very rarely, and so should not be classified into general pedestrian trips.

In a quite different approach, the U.S. Department of Housing and Urban Development (1977) classified all pedestrian trips into two categories based on degree of necessity: one is necessary trips, the other is optional trips. Necessary trips include walking to work, going on business, shopping, returning home from work, and walking to a bus stop or parkade. These trips take place under practically all conditions, and they are independent of weather or space arrangements. Optional trips are represented by window shopping, sightseeing, strolling for leisure, and so on. Optional trips will not happen if the weather is severe, or the spatial arrangement bad.

2) Spatial and Temporal Distribution of Pedestrian Trips in the Central Area of the City

Levinston (1974) pointed out that pedestrian movement in the central area is highly concentrated in the downtown retail and commercial core. A pedestrian survey in Edmonton's central area by the Transportation Department in 1987 provided similar findings (Edmonton, 1987b). With increasing distance from the retail and commercial core, pedestrian flow volume decreases (Figure 2-3).

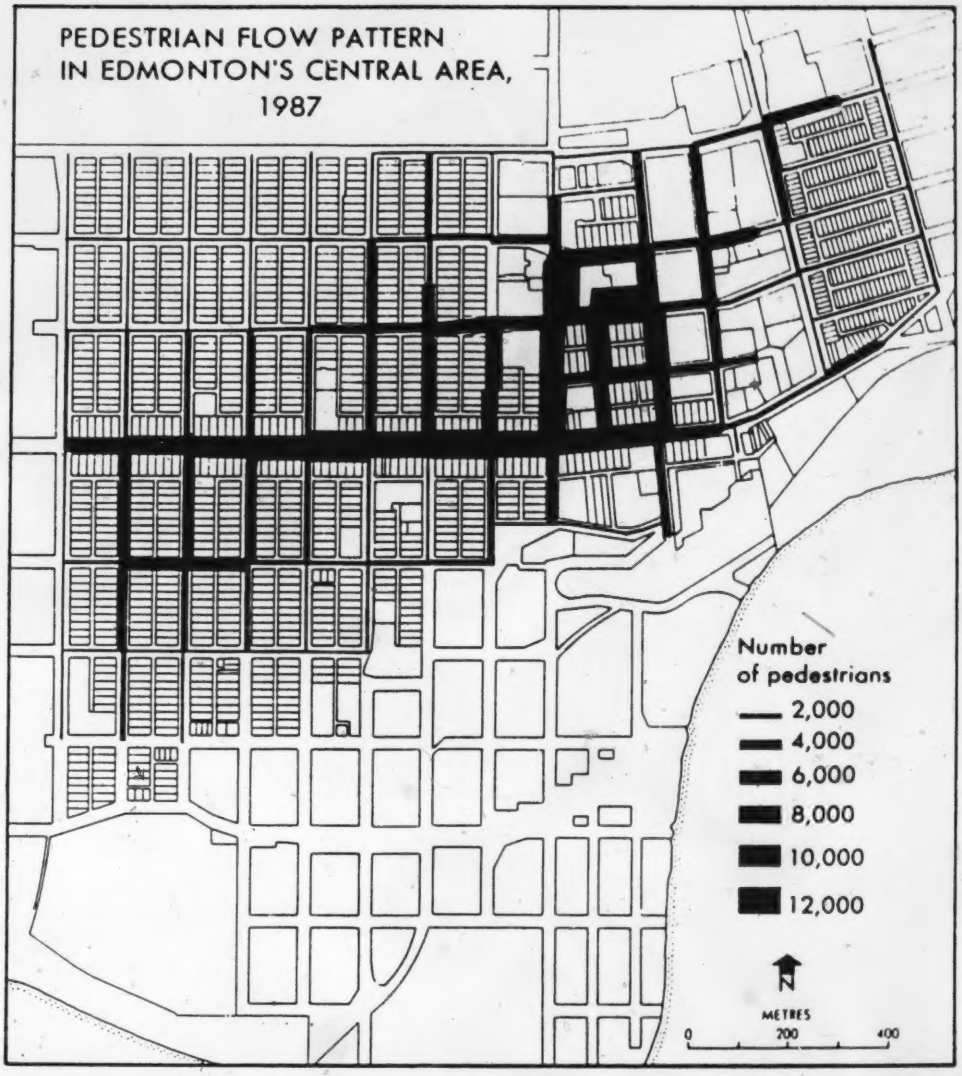

Figure 2-3 Pedestrian Flow Pattern in the Central Area of Edmonton, 1987 (Measured over the Time Period between 7:30 a.m. and 6:00 p.m.)

Source: Edmonton, 1987

Trip purpose varies widely in the course of the day. During the morning peak in the CBD, virtually all pedestrian travel is journeys to work (terminal trips or necessary trips). In midmorning, business calls and deliveries become important (use trips or necessary trips). At midday, eating and shopping trips predominate (use trips or necessary trips). In the early afternoon, trips home become significant and increase to an overwhelming proportion of all pedestrian travel during the evening rush (terminal trips or necessary trips)(Figure 2-4). Besides, the duration of the peak-period of certain pedestrian trips (such as shopping trips) lasts much longer than others (such as work trips and business trips). Therefore, the temporal distribution of shopping and leisure trips (use and pleasure walks or optional trips) is relatively even. Pedestrian trips also vary by the season of the year. In winter cities, in particular, optional trips are greatly reduced in winter, and then increase as the weather improves during spring.

It should be pointed out that it is very difficult to construct pedestrian flow patterns classified by trip purpose. A pedestrian involved in a lunch trip, for example, may later be on a shopping trip or even a pleasure trip following the same routes, with the choice varying at different times of the day.

3) Other Behaviour of Pedestrians

Morris and Zisman (1962) observed in their study on walking habits from parking facilities, that walking distance varies with the length of time parked and the purpose of the trip (workers being willing to walk farther than shoppers). Obviously, perception plays an important part here: many people will walk great distances unhesitatingly if they think they are closer than they actually are. This requires careful design to make the pedestrian environment attractive and comfortable. Levinston (1974) remarks as well that pedestrian travel behaviour can be modified by the qualities of the walking environment. Carefully designed walkways, malls, and concourses which afford interest, variety, and amenity, can increase the distances that people are prepared to walk.

Physical limitations appear to have a strong effect on the choice

This is page 27. The material on this page has been removed because of the unavailability of copyright permission. The material contains Figure 2-4 **Split of Pedestrian Trips by Purposes in Boston's CBD**. The original source of the material is Barber, 1986, p84 (see **Bibliography**).

of where to walk. Direct routes and short-cuts are preferred by pedestrians, while steps, slopes, and long uninteresting stretches are usually avoided.

2.2.3 Need for Pedestrian Facilities

Pedestrian facilities refer to the physical means and conveniences specifically designed for people who walk. These facilities include not only convenient paths, such as sidewalks and grade-separated pedways, but also inviting areas and resting points, such as pedestrian malls, plazas, and parks. The various pedestrian facilities together form a pedestrian circulation system.

The central area of the city serves a metropolitan region. It attracts people from all areas and all segments of the entire city. People go there to work, shop, sightsee, do business, or seek various services. In the CBD, according to Morris and Zisman (1962), 90 per cent or more of all daily trips may be walking trips. Each trip by car, bus, or subway begins or ends in a walk. Hence, pedestrian circulation is vital to the central areas of modern cities. The interaction among people at places of business, assembly, or recreation makes a city in all its varied aspects.

After the Second World War, private automobile ownership increased greatly, and central areas became more congested than ever. In many older cities with inadequate street networks, pedestrians delayed cars, and cars threatened the safety of pedestrians. Large numbers of cars threading their way through central areas also caused air and noise pollution. To solve these problems, it became necessary to reroute through-traffic and to manage the flow of cars in the central area, as well as to provide pedway networks to facilitate safe pedestrian movement. Breines and Dean (1974) stated that the provision of safe and inviting walking facilities could reduce much of today's urban congestion, since walking is the most efficient way to move large numbers of people for short distances.

Pedestrianization has also come to be seen as an important instrument of economic revitalization. Since the 1950s, downtown retail centers have been facing strong competition from suburban malls and shopping centres. These provide more modern amenities and spacious parking, and attract many customers who would once have shopped downtown. To deal with this challenge, the development of pedestrian malls and the provision of other pedestrian amenities (such as parks and plazas) have become vital elements of many downtown revitalization programs.

In addition, in those cities where the winter is long and inclement, there is great need for enclosed pedestrian facilities, such as skywalks, underground pedways, enclosed malls, and other at-grade interior paths. Such facilities not only facilitate necessary pedestrian trips, but also encourage optional pedestrian trips in winter time, thus playing a role in keeping downtown areas alive all the year round.

2.2.4 Pedestrian Facilities and Facility Systems

As has been mentioned above, pedestrian facilities refer to various physical means and conveniences designed specifically for pedestrian use. These take many different forms. In addition to conventional sidewalks, special pedestrian facilities include pedestrian malls, pedways (referring to both skywalks and underground tunnels), plazas, parks, city galleries, and pedestrian districts. The following are definitions of these various kinds of facilities.

1) Pedestrian Mall

Traditionally, the word "mall" has meant an area usually lined with shade trees and used as a public walk or promenade. As used today, "mall" denotes a new kind of street in the central area of the city oriented toward pedestrians or served by public transit.

In reality, there are two types of pedestrian mall, the full mall and the semi-mall. A full mall is obtained by closing a street that was formerly used for vehicular traffic, and then improving it with new paving, trees, benches, lighting, and other amenities such as sculpture and fountains. Full malls can be further differentiated as enclosed (roofed) or open; the roofs on enclosed malls may be either fixed or retractable. In a semi-mall, the amount of traffic and parking is reduced, and only public transit is allowed to enter. Expanded pedestrian areas are then provided with new trees and planting, benches, lighting, and other amenities.

Pedestrian malls have usually been developed out of the need for renewing downtown shopping areas to compete with suburban shopping centers, to create an image for a city, to increase retail sales, to strengthen property values, and to promote the interest of new investors. A well developed mall therefore creates an improved physical and social environment for the block or blocks in which it is located, and for adjacent areas as well (Rubenstein, 1978).

The following businesses and services are commonly found in pedestrian malls:

(1) retail establishments (department stores, specialty shops, and apparel shops)
(2) restaurants, bars, and cafes
(3) movie theaters, cinemas, commercial clubs
(4) professional and business offices

2) Walkway

Walkway is a term with broad meanings. It usually includes sidewalks, pedways, and stairways.

The sidewalk is the oldest and the most familiar form of pedestrian facility, so it needs little explanation here. New features are being added to sidewalks in some cities, to enhance their attractiveness to pedestrians. These include overhead canopies, consistent paving materials and landscaping, and heating devices for winter time.

Pedway is the short form of "pedestrian way", a facility designed exclusively for pedestrian use. Pedways are usually connections between major generators, such as shopping centres, office towers, and transport terminals. Pedways can be classified into three types according to their physical forms: above-grade pedways (referring to skywalks or skybridges), below-grade pedways (referring to underground tunnels), and interior pathways (referring to corridors within buildings) which can be at grade, above grade or below grade. Because there are interior corridors in so many buildings and most of these corridors are purely for internal use, only those interior corridors that are directly connected to skywalks or underground tunnels should be considered as elements of a pedestrian circulation system.

Stairway refers to sections of walkway located at the interchange point of different levels. In many cases, stairways are replaced by escalators.

3) Plaza

A plaza falls somewhere between a mall and a park. It is a small urban space: more than a street but nevertheless an integral part of the city's circulation system. Its antecedents include the Greek agora, the Italian piazza, and the English town square. A plaza can provide a charming park-like setting which will be appreciated not only by those who go there specially, but also by many more people who pass through it, as pedestrians, in the course of their daily business. (New Zealand, 1977).

The three basic uses of plaza space are as (1) circulation areas, required to provide adequate space for walking; (2) sitting areas, needed to provide opportunities for pedestrians to relax; and (3) vegetation areas, desirable to provide greenery (Pushkarev and Zupin, 1975).

Seeing that many plazas constructed in the recent past have been too large and uncomfortable for pedestrians, and that many plazas serve more to enhance the image for the building behind as the result of an exchange for increased building height, Untermann (1984) suggested:

> "It is usually better to be a bit crowded than too open, and to provide many smaller spaces instead of a few larger ones. It is better to have places to sit, planters and other conveniences for pedestrians than to have a clean, simple, and architectural space. It is better to have windows for browsing and stores adjacent to the plaza space, with cross circulation between different uses

> than to have the plaza serve one use. It is better to have retailers rather than offices border the plaza. And finally, it is better to have the plaza as part of the sidewalk instead of separated from the sidewalk with walls."

4) Park

A park here refers to a large, usually grassy, enclosed piece of land, or public garden, in a city centre, used by the public for pleasure and rest. Parks mainly provide open space for recreation and social gathering, but they also offer resting areas along walkways. If properly designed, parks can function as part of pedestrian networks far more than they do now (Benepe, 1965).

5) City Gallery

This is a relatively new concept. A "city gallery" is actually a special kind of walkway linking a series of galleries, each of which portrays a unique theme of relevance to a city's heritage. Usually, a city gallery is well paved and decorated. It not only facilitates the movement of pedestrians, but also provides features of educational and cultural interest. The Heritage Trail in Edmonton's central area is an example of a city gallery.

6) Pedestrian District

A pedestrian district, also called a pedestrian precinct, is an area in which several streets have been closed or reconstructed to restrict vehicular traffic. It is not limited to present street patterns, but rather creates entirely new walking areas where people can do their shopping at leisure and in great safety. It may also include a variety of specific pedestrian facilities.

The scale of pedestrian districts varies depending on the needs of individual city centres. According to Malt (1975), existing pedestrian districts in U.S. cities seldom exceed 400 to 500 metres in any one direction. This is derived from the maximum distance pedestrians are willing to walk. Some pedestrian districts are larger, but they require "a form of transportation less powerful than a conventional vehicle to supplement foot power" (Breines and Dean, 1974 p46). This includes mini-vehicles, such as ~~the so-~~called "people mover", and other supplementary transport facilities, such as moving sidewalks.

From the above definitions, it can be seen that the functions of pedestrian facilities range from the pure facilitation of pedestrian movement to the provision of various amenities. However, individual facilities should not be planned and developed without good connections with one another. Levinston (1974) pointed out that pedestrian plans should reflect the coordinated mobility, environmental and economic needs of the entire centre to be served rather than the individual requirements of specific buildings, each considered in isolation. That is, all pedestrian facilities in the city centre should be integrated together to form an efficient circulation system, well related to the total land use structure of the centre.

Literally, a system is a complex unity, or organization, formed of many, often diverse parts subjected to a common plan or serving a common purpose. The most important characteristic of a system is the interactions taking place among its different components. Similarly, a pedestrian circulation system refers to the physical environment in which diverse walking paths (walkways) effectively link all origins and destinations (generators), as well as other elements of pedestrian facilities (parks, plazas, etc.) in a complex pattern of interaction. A well-developed pedestrian circulation system should permit the free flow of pedestrians within the whole system. In other words, an efficient pedestrian circulation system should allow easy exchange of pedestrians among individual facilities, without obstacles. Furthermore, pedestrian-oriented links are also proposed to turn the single pedestrian circulation system into a mixed system, that is to say, into combined but improved pedestrian and traffic systems which will benefit pedestrians (Uhlig, 1979). An integral part of such a mixed system is the interface, or contact point of one singular system (such as the pedestrian circulation system) with another (such as the transportation system). The transportation system usually provides for access to the central pedestrian circulation system from outside the central area.

To make a pedestrian circulation system attractive, comfortable, and safe, the following amenities or fixtures are often coordinated with particular facilities:

(1) grass, shrubs, and trees (for beautifying the area)
(2) fountains and pools (for beautifying the environment, and cooling and cleaning the air)
(3) drinking fountains
(4) raised platforms or stages (for public events)
(5) sculptures (for ornament)
(6) canopies and bus shelters (to protect pedestrians from inclement weather)
(7) information and news kiosks, telephone booths
(8) instant banking outlets
(9) seating (for rest)
(10) street vendors
(11) lighting fixtures
(12) playgrounds for children
(13) signs and directories
(14) trash receptacles

2.2.5 Goals and Principles for Pedestrian Facility Planning

1) Goals

Planners have proposed various goals for the development of pedestrian facilities. These goals can be generalized into four categories: functional; social; economic; and environmental (United States, 1977):

(1) Functional goals aim at improving the circulation of pedestrians, and reducing the conflict between people and vehicular traffic. All walkways, especially grade-separated pedways, serve these goals.

(2) Social goals are concerned with developing pedestrian

facilities to provide leisure opportunities, to offer chances for social meetings, to participate in and observe activities in the central area, and to activate the central area by creating a better image for it. The provision of downtown parks and plazas mostly meets these goals, and so too do pedestrian malls in part. The amenities such as stages, platforms, information kiosks, seats, and playgrounds also serve this purpose.

(3) Economic goals aim at increasing sales of goods and services, and increasing business revenues by attracting more local pedestrians and outside tourists, thus reducing the competition from suburban shopping centres. The development of pedways and pedestrian malls is strongly related to economic goals.

(4) Environmental goals aim at offering a safe and pleasant walking environment and protecting pedestrians from inclement weather by providing climate-controlled facilities such as roofed pedestrian malls and enclosed pedways, as well as sidewalks with canopies. Some researchers have listed the reduction of pollution as one of the environmental goals, as well. This is usually achieved by removing vehicles from pedestrian districts, or at least reducing their numbers. In practice, however, this has proven to be the least important goal for the development of pedestrian facilities, because the facilities do not reduce the amount of pollutants, they only help to separate pedestrians from sources of pollution.

The experiences of most North American cities indicate that functional and economic goals have been the most direct spurs to the development of special pedestrian facilities (see Sections 1.1 and 2.2.3). However, in winter cities (especially Canadian cities), environmental goals are equally important. This has been best reflected in the development of the pedestrian facility systems in the central areas of Toronto, Montreal, and Calgary (see the 3rd part of this section). Social goals are becoming a more conscious consideration as well, because of the desire of the public to improve the quality of their lives.

2) Principles

To achieve the above goals, planners have also proposed a variety of principles as guidelines for the development of pedestrian facilities in urban central areas. These principles cover the range from highly general to fairly concrete. For example, Levinson (1974) proposed that implicit in pedestrian circulation planning is the philosophy that cities are for people. He therefore emphasized that people should be given first consideration in the planning process. Similarly, in a study for the Federal Highway Administration in the United States(Peat, Marwick, Mitchell, 1974), it was stated 1) that pedestrian facilities should be available when they are needed, and 2) that they should be available to all pedestrians who want to use them. These principles are too general, however, and they tell little about the kinds of facilities that should be developed and where particular facilities should be located.

There are also concrete principles that are more practical and more useful. For instance, the segregation of pedestrians from vehicular traffic has come to be accepted as a basic planning principle. Of the three fundamental separation techniques, which are horizontal, vertical, and time segregations, horizontal segregation is proposed usually in the frame of the central area where land is comparatively cheaper, densities lower, and multiple land use less important. Within the CBD, with its multiple uses of land and high density of activities, vertical segregation (such as skywalks and underground pedways) is strongly recommended and justified (Ritter, 1964). Segregation by time has promise only in areas where there is a high concentration of pedestrian movement, or where daily deliveries of goods are needed, during certain time of the day or certain time of the year. An example is Pell and Doyers Streets in the heart of New York City's Chinatown. The two streets there are very narrow and are the home of many small businesses, restaurants, and residences. Many of the businesses are family-owned, and entire families frequently participate in the daily operation. To the people of Chinatown, the two streets are their front yards. As a result, it was recommended that vehicular access to these two streets be prohibited except at night (10 p.m. to 6 a.m.). This technique is also used to create seasonal or temporary pedestrian districts. For example, several streets in the central area of Edmonton are closed to traffic for certain times of the year during the summer festival of Klondike Days.

With the vertical expansion of the central area, pedestrian systems have become an important factor in building design. Skyscraper technology permits thousands of people to be packed into megastructures, but the people who work in these large buildings have needs beyond their daily employment. This issue has caused new principles to be proposed, such as the requirement that high-rise development consider both the internal and external elements of pedestrian facilities. Internal elements include lobbies; corridors and doors; pedway connections to transit stations, garages, and adjacent buildings; and mechanical aids such as elevators and escalators. External elements include pedestrian plazas; sidewalks; crosswalks; surface transit stops; and grade-separated linkages with other large pedestrian generators (Fruin, 1974a). Easy entry to and exit from a building depend on a coherent pedestrian traffic network both within and outside the building. Lobbies, concourses, passageways, outdoor plazas, sidewalks, stairways, escalators, and elevators must all be coordinated to help the pedestrian find and make his way. In addition to serving the offices, shops, and restaurants within the high-rise building, these facilities should also be designed to facilitate the flow of pedestrians through and around the building, even though the traffic is not directly generated by the building (Zimmerman, 1974).

Another principle requires continuity in the overall pedestrian facility system. Continuity is a pathway attribute that expresses the extent to which a given pathway between two points is interrupted by obstacles (e.g. vehicular conflicts, vertical changes, turning movements, directional decision points, and even unattractive activities and sights along the path) which impede movement along the pathway. The principle of good continuity means that system design should aim to minimize the effects of various impedances on the pedestrian (Peat, Marwick, Mitchell, 1974).

In winter cities, additional principles are called for. The most basic one requires that pedestrians be protected from inclement weather. Thus, skywalks and underground tunnels are often completely enclosed and climate-controlled. In Canadian cities, this principle has been best embodied in the downtown pedestrian circulation systems of Toronto, Montreal, and Calgary.

3) Some Examples of the Application of Planning Principles

The goals of developing pedestrian facilities in the central areas of different cities are usually similar, but the approaches individual cities have adopted to achieve these goals are often distinctive. Some examples will be briefly described to show how the above-described principles have been applied in particular cities.

In North America, many cities have adopted vertical segregation as the main principle for developing pedestrian facilities in their central areas. Minneapolis in the United States and Calgary in Canada are fine examples. Minneapolis counts as the most pedestrian-oriented city in the United State, and the chief feature of its pedestrian system is a series of mid-block enclosed pedestrian bridges that join the second floors of buildings facing one another across a street. The first skyway bridge was built in 1962. By 1975, there were twelve of them in use, connecting eleven high-density CBD blocks of office and retail buildings (Wiedenhoeft, 1975).

Calgary is also well-known for the elevated pedestrian system, called "+15", in its central area (Figure 2-5). The +15 concept refers to the approximate development height for skywalks, 15 feet being the minimum clearance required over streets and lanes. Underlying this concept are a series of elevated and ground-level plazas and walkways, with skywalks that utilize existing interior building layout and mid-block connections to serve the downtown core. There, the principle of vertically separated pedestrian walkways, shopping malls, plazas, and closed streets was adopted as being more desirable than street widening or restricting future development densities. In Calgary, an upper-level pedestrian system was preferred to an underground system because it could (1) create a more acceptable walking environment; (2)

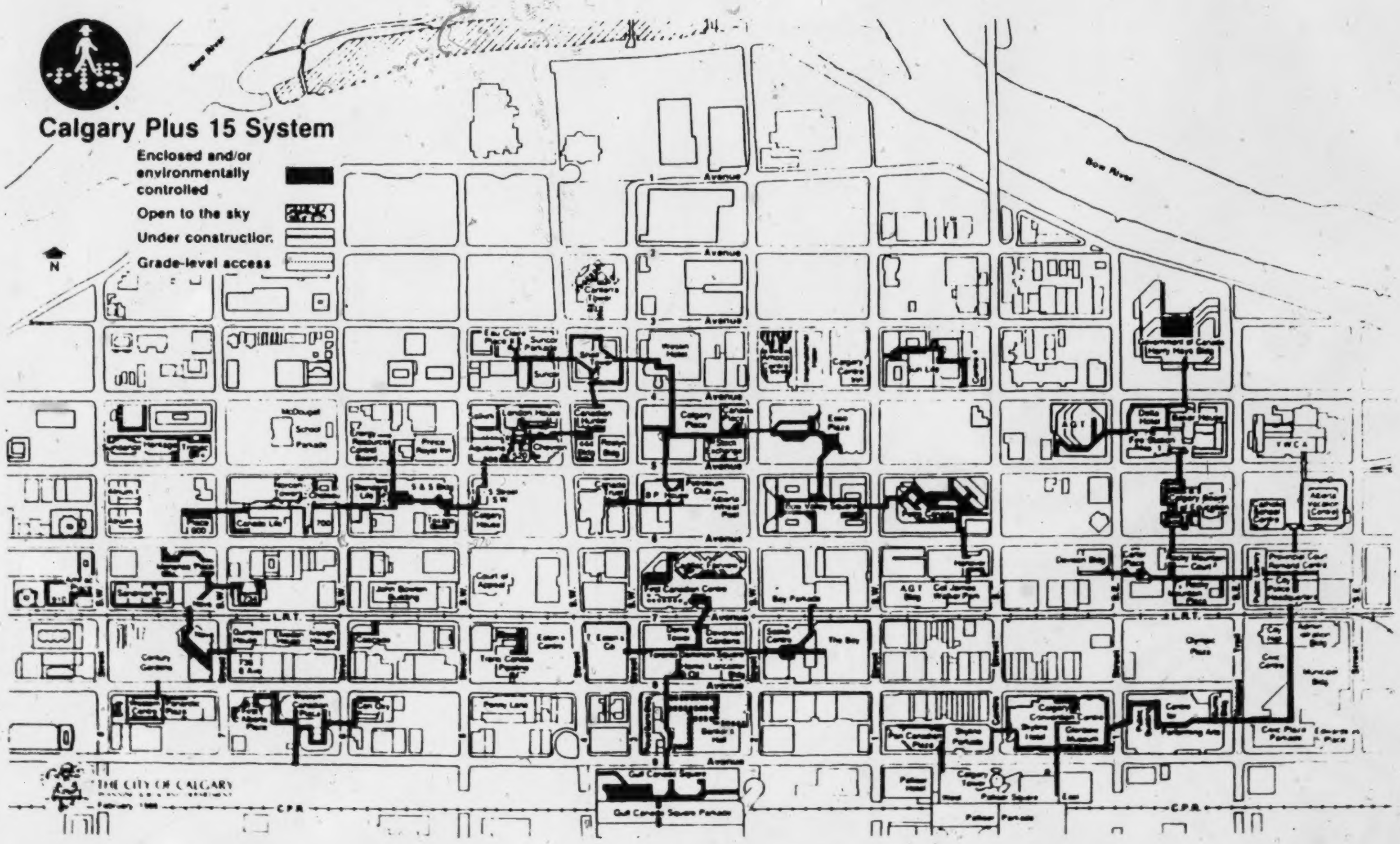

Figure 2-5 Calgary's +15 System

Source: City of Calgary Planning and Building Department, 1988 avoid the expense of combatting a high water table; (3) avoid the costly relocation of underground utilities; and (4) utilize existing interior building layout and improve accessibility to and within buildings (Pendakur, 1971). At present, Calgary's +15 system, with 41 bridges and 9km of walkways, is the largest above-grade pedestrian system in the world (Lyons, Sinclair and Lum, 1987).

In contrast to Calgary's above-grade pedway network, Montreal has one of the largest and best known underground systems. It began with the development of the Place Ville-Marie shopping mall and its associated 42-storey office tower between 1958 and 1962 (Collier, 1974). Underground linkages were built between the Place Ville-Marie complex and the nearby Canadian National Railway Station and Queen Elizabeth Hotel. The initial small-scale network proved so popular that subsequent linkages were made to other large developments in the central area of the city. By 1987, Montreal had a 12km network of tunnels and shopping malls (including the Metro lines between the sections of true pedestrian facilities) that pedestrians can use without setting foot outside (Hamilton, 1987). Notably, Montreal incorporated shops and various stores into the pedestrian system to revitalize retailing activities in its central area. To date, Montreal's tunnels connect 1000 stores and 100 restaurants and bars with theatres, hotels, office buildings, residential highrises, and rail, bus and subway stations (Hamilton, 1987).

Toronto also has an extensive underground pedestrian circulation system, with more continuity than Montreal's (Figure 2-6). The system was initially developed along the Bay Street corridor. With its growth over the last 20 or so years, the system has spread as far west as University Avenue, east toward Yonge Street, and north to Dundas Street, with 4.5km of interconnected walkways and shopping malls tying 400 shops and 3,000 hotel rooms, 3,000,000m^2 of office space, and various residential projects (Zepic, 1987). Toronto's central pedestrian circulation system was strongly influenced by a planning report **On Foot Downtown**, which was approved by City Council in 1969 (Goodman, 1984). The report emphasized the importance of developing a comprehensive system linking both public and private spaces. The

This is page 41. The material on this page has been removed because of the unavailability of copyright permission. The material contains Figure 2-6 **The Underground Pedway System in Downtown Toronto**. The original source of the material is Goodman, 1984, p52 (see **Bibliography)**.

report suggested that the links be separated from the streets in order to avoid the conflicts between pedestrians and vehicular traffic. The system was also proposed to include open spaces, particularly small, quiet green areas as integral parts of the system, to provide a variety of activities (Toronto, 1973).

The central pedestrian circulation systems in both Montreal and Toronto have been developed with effective connections to their public transit systems to form a mixed system. From Figure 2-6, it can be seen that the pedestrian circulation system in Toronto is well tied to its central subway stations.

Finally, Calgary, Montreal, and Toronto all developed their pedestrian circulation systems to provide a enclosed and climate-controlled environment. This is to meet another principle—to provide pedestrians with protection from inclement weather.

2.2.6 Impacts of Pedestrian Facilities on Land Use

Knowing that land uses are pedestrian generators, and different land use types have different generation effects, it follows that land use changes in the central area of the city will cause shifts in pedestrian facility requirements. However, pedestrian facility development is not purely passive to land use change. It can also contribute to changes in land use. This section will review some of the important impacts of pedestrian facilities on land use.

Experiences from German cities suggest that the development of pedestrian facilities can have many impacts on the central area. For example, it can result in an increase of visitors, higher values of sales, more rapid turnover of goods, the addition of specialty shops, and renovation, modernization, and expansion of existing shops, all enhancing the commercial use of land. The development of pedestrian facilities can also increase real estate values and raise rents in the central area, thus pushing some functions into adjacent areas or onto side streets, and causing changes in activity structure. Conversely, the availability of pedestrian facilities can bring in new activities and decrease vacancy rates (Wiedenhoeft, 1975b).

The experience of Minneapolis indicates that the skyways there have caused second-floor rents to increase to match those of the ground floors, without the ground-floor rents being reduced. A second level of retail-commercial and service establishments has thus been created (Uhlig, 1979). Underground pedways can have similar effects. Skywalks and below-grade pedways both help make a downtown more compact.

The construction of high-rise buildings with pedestrian facilities also has obvious impacts on land use. For instance, some skyscrapers have been found to remove, not incorporate, street services. Small shops that once served downtown areas have disappeared to be replaced by vast lobbies and concourses, used as corporate symbols, surrounded by empty plazas (Ramiti, 1979), though some of the concourses are used as retail and service areas.

Additionally, the development of pedestrian facilities may cause a reordering of central city transportation, such as the rerouting of vehicular traffic and the relocation of parking spaces and utilities. In their turn,these can result in changes in the surrounding structures. Uhlig (1979) remarks that pedestrian zones (districts), like other types of planned development, always cause considerable changes in the surrounding structures. For example, the establishment of limited pedestrian zones can result in retail activity being drawn to the streets and squares in these zones; the attraction of a pedestrian zone can lead to other areas "drying out".

Lastly, pedestrian facilities themselves consume urban land, adding new elements to the existing land use patterns.

2.2.7 Some Criticisms of Pedestrian Facility Development

Obviously, the above impacts can be either positive or negative from the viewpoint of different interest groups. As a result, public attitudes toward pedestrian facility development vary greatly. Mostly, pedestrians and those businessmen who benefit from these facilities welcome their construction. But there are also likely to be other people who will oppose the location of such facilities in certain areas of the city centre. These opponents may include the following:

1) adjacent merchants, who fear a loss of business due to the

competition from pedestrian malls and other businesses with convenient pedestrian facilities;

2) taxi drivers, truckers, and private bus companies, who see traffic-free zoning as a threat to their interests;

3) city traffic planning agencies, which resist the idea of having present street systems disrupted;

4) taxpayers, who complain when public funds are spent on a pedestrian zone;

5) conservative political organizations, which argue that pedestrian zones represent a bureaucratic intervention in the private sector—one more threat to free enterprise and freedom of choice.

A letter to the **New York Times** from a realty investor reads, "What does Mayor Lindsay expect to accomplish by closing Madison Avenue? ... It is not a residential street bordered by homes; it is a very important business area. People who use Madison Avenue, do not come there to relax but to work. New York City streets were opened and dedicated for traffic and street purposes, not rest areas (Robertson, 1973).

Because of these controversies, the development of pedestrian facilities does not always correspond to locational need. This may explain why such facilities are not always provided, even when there is a high demand for them.

2.3 Contribution of the Literature Review to the Formulation of the Thesis Study

From the literature review, I derived four main points that influenced the research design for this thesis.

First, there are generally two forces for pedestrian facility development: one is objective demand which derives from different land use types and particular building structures; the other is conscious planning which is the policy response to objective demand or spatial shift of demand. In theory, objective demand should be more important to pedestrian facility development than planning policies, because the facilities are ultimately built to serve pedestrians who have need of them. But in reality, planning policies are sometimes more influential because objective demand by itself does not produce facilities. It is through the implementation of official planning policies that substantial development of pedestrian facilities is secured. In this sense, pedestrian facility development is in fact the outcome of the dynamic process of interaction between these two forces. The thesis study has been designed to focus on this relationship between objective demand, on the one hand, and facility planning and development on the other.

Second, the central areas of the North American cities are not developed at a uniform intensity, but are organized in a core-frame structure. The core or CBD is an exceptionally limited area of very high land value upon which most of the downtown retailing, financial, and firm headquarter office uses are concentrated. From the viewpoint of pedestrian study, these activities usually require face-to-face contact and have the highest pedestrian generation rates. The frame is given over to a variety of business and commercial functions, as well as to institutional and residential uses, which have been observed to have relatively lower pedestrian generation rates than the typical CBD functions. The frame as a whole is not a uniform area either, but can be divided into different sectors (or functional areas). Distinct pedestrian generation effects have been observed among these sectors. It is therefore reasonable to expect that there should be a spatial discrepancy in the objective requirement for pedestrian facilities between the core area and the frame, and even within the core and the frame (i.e. among functional areas). For this reason, the study has been designed to divide the central area of Edmonton into functional areas by their basic activities. By this means, the relationship between the spatial placement of pedestrian facilities and the land use patterns in Edmonton's central area can be better interpreted.

Third, planners have proposed various goals for the development of pedestrian facilities in urban central areas. To achieve these goals, planners have also proposed a variety of principles, such as the segregation of pedestrians from vehicular traffic, continuity of pedestrian facility systems, and protection of pedestrians from inclement weather. This study will address the extent to which these principles have been applied to the development of the pedestrian facility system in Edmonton's central area.

Finally, it is understood that pedestrian facilities refer to various physical means and amenities designed specifically for pedestrian convenience and to be accessible only to pedestrians. These facilities may take different forms, such as conventional sidewalks, pedestrian malls, grade-separated pedways, parks, and plazas. However, individual facilities will effectively perform their functions only when they are integrated together to form a system, and that system is well related to the total land use structure of the central area. Therefore, although the development of pedestrian facilities has been examined by individual projects, the integration and connections between them will also be addressed.

Chapter 3 Methods and Data Sources

The value of a research study depends to a great extent on its scientific approach and the reliability of its data. This chapter will therefore provide a detailed description of the methods and data employed in the thesis.

3.1 Division of the Study Period

Land use change and pedestrian facility development are sequential, so the study period of 1966-1986 (the time period for pedestrian facility study is extended to 1987) is divided into four five-year subperiods. Separate tables for 1966, 1971, 1976, 1981, and 1986 (1987 for pedestrian facilities) are constructed as a basis for analysis, to show the sequence of land use changes and pedestrian facility development. By this means, the association of pedestrian facility development with major land use change events and planning policy adjustments can be better reflected and interpreted. Furthermore, knowing that different activities have different pedestrian generation effects, and that locational demand for pedestrian facilities depends on particular land use organizations, a comparison and interpretation of land use data for different years will provide more valuable information on the spatial shift in demand for pedestrian facilities.

3.2 Division of the Study Area

As has been stated in Chapter 2, urban central areas are normally developed in a core-frame structure, and the frame is usually composed of sectors or functional areas. These sectors have obvious differences in land use type and functional structure, thus generating distinct demands for pedestrian facilities. This is also true of Edmonton's central area. For this reason, the study area had first to be divided into a core (CBD) and a frame, and then further subdivided into functional areas.

3.2.1 Delimitation of the CBD

There are generally three approaches to CBD delimitation. These are: retail sales attraction, land values, and the functional approach (Horwood and Boyce, 1959).

1) The retail sales attraction approach takes blocks as minimum units to calculate retail trade figures, and requires that a minimum value be set as an index to delimit the CBD's boundary. All the blocks with a gross retail sales value over the predetermined index will be included in the CBD. This approach obviously emphasizes the importance of retail activities, which gives rise to a number of deficiencies. First, retail sales vary greatly from city to city, so it is impossible to determine a normal index value. This means that cross-city comparisons are also impossible. Second, this approach excludes the important role of business offices, whose revenue is not included in retail sales. Third, it is usually difficult to obtain data because most businesses are reluctant to release sales figures.

2) The land value approach consists of assigning a value of 100 to the lot with highest front-foot value. The values of all other lots are shown as percentages of the peak value lot. The line enclosing lots with a value index of 5 percent or higher has been used to define the boundaries of the CBD.

This method has little value because of the following shortcomings: first, it gives no indication of land use types in the area it defines; second, land value change does not always correspond with land use change, but may be a response to other factors (e.g. a major development project in an adjacent area, or political decisions on the future of the area); third, reliable data on land value are difficult to obtain.

3) The functional classification approach was developed by Murphy and Vance, and is characterized by two indices: one relates to the building height, and the other to the intensity, of central-type uses in any given block. Murphy and Vance did not provide a complete list of CBD-type activities, but they designated those characteristic functions of central areas which are considered as non-CBD in character (Table 3-1). The obvious inference is that all other activities can be regarded as CBD uses.

Under this method, the central business height index represents

Table 3-1 Central Types of Land Occupance Considered to be Non-Central Business in Character

---

- permanent residences (including apartment houses and rooming houses)
- governmental and public (including parks and public schools as well as establishments carrying out city, county, state, and federal governmental functions)
- organizational establishments (churches, fraternal orders, colleges, etc.)
- industrial establishments (except newspapers)
- wholesaling
- vacant buildings or stores
- vacant lots
- commercial storage

Source: Murphy and Vance (1954) p204

the number of floors of central business uses, if these are thought of as spread evenly over the block. The index is obtained by dividing the total floor area of all central business uses by the total ground area of the block (CBHI=central business floor space/total ground floor space). The central business intensity index is the proportion of all floor space in a block which is in central business uses. It is the percentage that the total floor area of central business uses makes up of the total floor space at all levels (CBII=[central business floor space/total floor space]x100). According to Murphy and Vance, to be considered CBD in character, a block must have a CBHI of 1 or more and, at the same time, a CBII of 50 percent or more.

Although Murphy and Vance's indices have been criticized in that the choice of critical values is arbitrary, it seems to be generally agreed that the indices clearly represent land uses in the defined area, and are suitable for comparative studies. Besides, the data that the indices require are available in most cases.

In the thesis research, it proved impossible to collect data about retail sales and land values in Edmonton's central area, but approximate floor spaces for different activities in each block can be derived from land use maps. For this reason, I decided to use Murphy and Vance's indices to define the CBD boundaries in the study area. But there was still one problem with the application of this approach to Edmonton's central area. According to Murphy and Vance, parking uses of land are presumed to be CBD-type occupance. However, this cannot be accepted for the thesis study. In Edmonton's central area, many surface parking lots are temporary. Parking is a holding use for otherwise vacant land awaiting development. If these parking lots are included in the CBD-type of land occupance, the extent of the CBD will be greatly exaggerated. To deal with this problem, one modification was made with respect to parking uses. For thesis purposes, all surface parking lots are treated as non-CBD occupance, but all parking garages are classified as CBD uses. The justification for this modification is that multi-level parkades are permanent structures. They are built in the central area to offer employees and shoppers access to the CBD.

The boundaries of the CBD in Edmonton's central area were defined with Murphy and Vance's indices. The data for floor space and ground area were calculated from the land use maps constructed for this thesis. Given the scale of the base maps, the ground area of each block or lot was easily calculated. But because buildings do not always occupy a whole lot or parcel of lots, and sometimes a high-rise tower stands on a much wider podium, the method of calculation need to be modified (see Section 3.4.3 in this chapter).

3.2.2 Designation of Functional Areas

As has been stated previously in this chapter, the basic division of the study area is into CBD and frame, and both the CBD and the frame are then subdivided into sets of functional areas. This subsection is to discuss the designation of the functional areas.

There have been previous studies which divided Edmonton's central area into sets of functional areas, distinguished by their basic activities, such as retailing, government offices, civic functions, and housing (see Bannon, 1967; Edmonton, 1979 and 1981). Unfortunately, however, because there have been no mutually agreed criteria, the boundaries of these functional areas have been defined arbitrarily. Therefore, it was felt necessary to re-define the functional areas for the thesis purposes, with reference to recent land use information. The first decision was to accept CBD boundaries for 1986. The CBD was then divided into two areas along 103rd Street (Figure 3-1): to the east is the CBD-commercial core, where most downtown retailing outlets and financial services are concentrated; to the west is the CBD-west extension, where retailing activities and financial services are less important, but other services (such as professional and personal services, firm headquarters, and hotels) and governmental functions are predominant. The boundary was chosen because the Bay department store, which is located on Jasper Avenue east of 103rd Street, used to be the traditional retailing anchor in the central area and should be included in the commercial core. Next, the frame was divided into five functional areas (Figure 3-1). These are the Boyle Street area (which is a discarded sector in Preston's terms), the civic centre, the wholesale-warehouse area, the provincial government centre, and the McKay Avenue area (a residential area).

In most cases, blocks are used as the minimum unit when functional areas are designated. There is one exception to that rule. By Murphy and Vance's indices, the superblock in the southeastern part of the civic centre, where Canada Place has recently been constructed, is a CBD block. However, if this whole block is included in the CBD-commercial core, the civic centre will be cut into two separate parts on either side of Jasper Avenue. A compromise has therefore been adopted, by which the superblock is divided into two parts by following the former line of 98th Street. The western part is included in the CBD commercial core and the eastern part in the civic centre. Two explanations support this separation. First, 98th Street was closed not long ago and Canada Place was still under construction in 1987, when the data for the thesis were collected. Second, Canada Place is a federal complex which will mainly house government functions, while the buildings in the western half of the block all

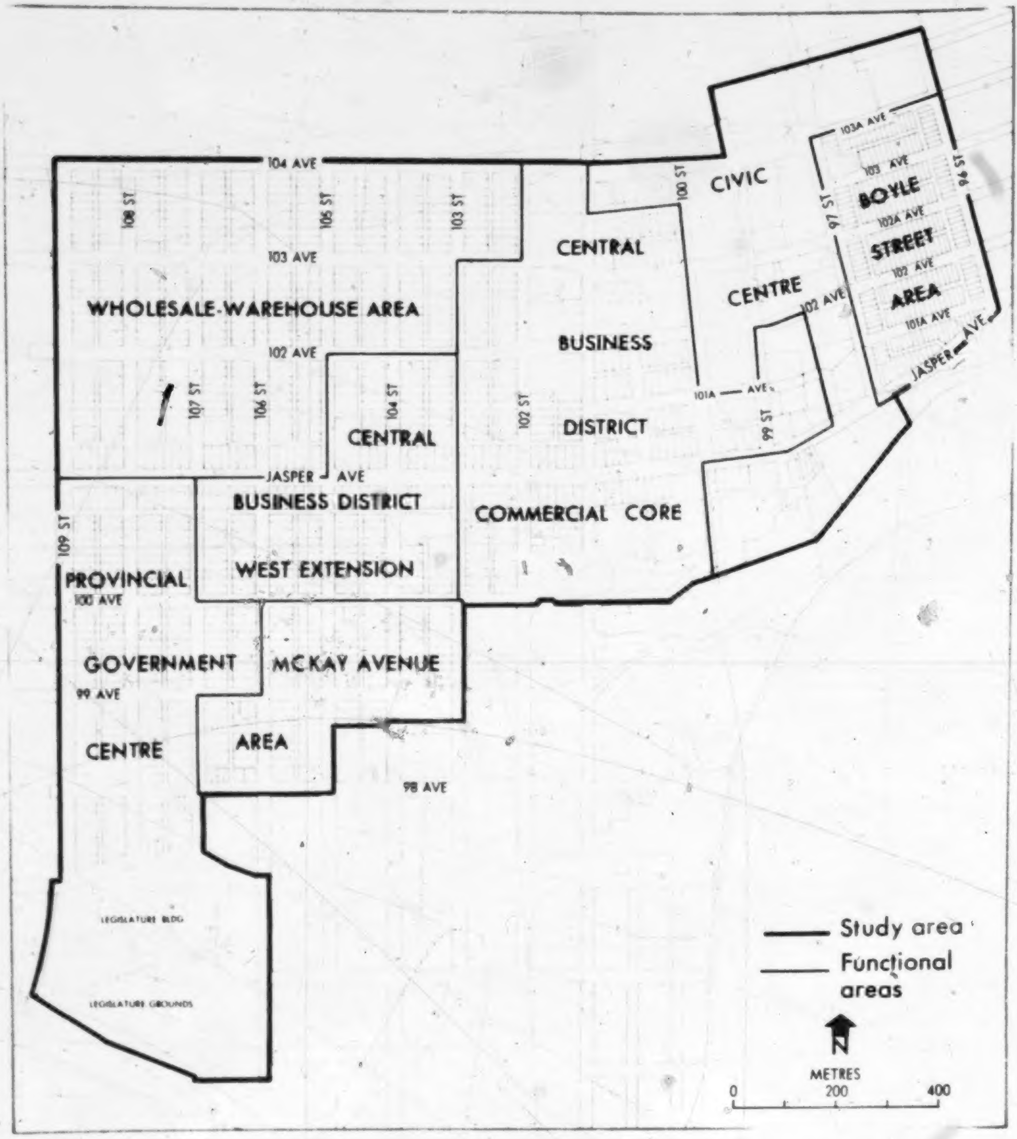

Figure 3-1 Functional Areas in the Central Area of Edmonton

house CBD-type activities.

Because the CBD boundaries determined by Murphy and Vance's indices have changed over time, but functional area boundaries are assumed to be fixed (because there are no commonly agreed criteria to delimit functional areas), the designated functional areas do not coincide with the CBD confines before 1986. For this reason, land use changes will be examined both by functional areas and the for the CBD as a whole, to demonstrate the development of the functional areas and the evolution of the present-day CBD.

3.3 Data Sources

Identifying specific information is critical for any research. As has been specified in Chapter 2, this study is to focus on the two forces of pedestrian facility development: objective demand and conscious planning. Therefore, two broad sources of information have been explored and collected: the first concerns land use change; the second, pedestrian facility planning and development.

The data for land use change have mainly come from three sources. These are Henderson's Edmonton Street Directory, aerial photographs, and field survey. The data were used to compile land use maps for 1966, 1971, 1976, 1981 and 1986. Unfortunately, these maps are too detailed to be reproduced in the thesis.

The 1986 land use maps, from which floor spaces for different functions in the same year were derived, were compiled from Henderson's Edmonton Street Directory in the first instance. The information desks and directories in highrise buildings were then consulted to eliminate possible errors, since Henderson's Directories do not always reflect very recent changes of occupants.

The land use maps for 1971, 1976, and 1981 were again compiled from Henderson's Directories, supplemented this time by aerial photographs. The latter were used to determine property boundaries; the former were used to determine the activities in each building. Under such circumstances, it is almost impossible to identify errors in Henderson's Directories, which to some extent reduced the accuracy of these maps and the floor space data derived from them.

The 1966 maps were modified from Bannon's thesis (1967). Because of the different land use classification scheme he used, as well as some obvious errors, adjustments were made so that the 1966 data are comparable with those for later years.

Information regarding pedestrian facility planning and development came mainly from various technical reports and official plans prepared by different civic departments of the City of Edmonton, and from the rich resource of newspaper clippings in the City of Edmonton Archives. Personal interviews with staff members in the above agencies have also been conducted many times to clear up the questions which could not be satisfactorily answered from other sources. The map which presents pedestrian facilities for 1987 was completed through field survey. The maps for 1971, 1976, and 1981 were constructed mainly from the planning reports and from **Edmonton Journal** articles.

3.4 Land Use Classification and Measurement of Land Use Change

3.4.1 Land Use Classification

In his pioneer study of pedestrian facility planning, Fruin (1974b) pointed out that accurate classification of land use is important because of the extreme variability of pedestrian demand and design treatment. The classification scheme used in this study has been adopted from one developed by Chapin and Kaiser (1979). (See Appendix 1.) The justification for adopting the Chapin and Kaiser system is twofold. First, it is highly detailed and includes all the activities found in Edmonton's central area. Second, this system itself is adapted from the Standard Industrial Classification (SIC), which has been widely used in North American cities.

At first, all working maps for the thesis study were plotted using the detailed land use classification. When interpretation was attempted, however, the classification scheme proved to be too detailed for analytical purposes. The land use classes were therefore collapsed into a simpler classification scheme employing 12 categories (Table 3-2). This revised classification retains only those activities that have been identified in Edmonton's central area, and mostly

Table 3-2 Integrated Land Use Classification (arranged in a descending order in terms of the number of pedestrians generated by per unit of area)

---

1 retail trade (including categories 53 to 59 in Appendix 1)
2 financial services (category 61 in Appendix 1)
3 personal, medical, and other general and professional services (including categories 62, 63, 65, 66, 67, 68, and 69 in Appendix 1)
4 firm headquarters and business offices (category 60 in Appendix 1)
5 government and civic functions (category 75 and 76 in Appendix 1)
6 other human development, recreational, institutional, and public activities (including everything in category 7 in Appendix 1, except for 75 and 76)
7 parking and auto repairing (category 64 in Appendix 1)
8 transportation, communication, and utilities activities (including everything in category 4 in Appendix 1)
9 residential activities (category 8 in Appendix 1)
10 wholesale and warehouse activities (categories 50 and 51 in Appendix 1)
11 processing and manufacturing activities (including everything in category 2 and 3 in Appendix 1)
12 no activities (category 9 in Appendix 1, including vacant land, vacant floor, and construction site)

---

generalizes the activities in Appendix 1 at the main category level. The only major change was to split service activities into four separate categories, because financial services, firm headquarters and business offices, and commercial parking are very important functions in the central area of Edmonton; they each account for about 10 per cent of the total floor space for the whole central area. In addition, and more important for thesis purposes, they have different pedestrian generation effects. For example, a bank usually generates many more pedestrian trips than a parking lot of the same ground space.

All the land use maps that were reproduced to provide floor space data for different functions follow up the classification set out in Table 3-2. It may also be noticed that the various activities in Table 3-2 have been arranged in a different order from Appendix 1. This was done to meet the needs of the thesis study.

In Chapter 2, it was mentioned it would be desirable to be able to rank various activities in terms of their pedestrian generation effects. Because no ranking scheme is available for ready use, I have had to attempt to develop such a ranking by myself. In their studies, Pushkarev and Zupin (1975) found that office buildings produce more pedestrians per unit of floor space than residences, and restaurants attract many more pedestrian trips per unit area than the same amount of office floor space (see Section 2.2.1 in Chapter 2). In 1980, 1981, and 1987, respectively, the City of Edmonton Transportation Department conducted three on-street pedestrian flow surveys. The pedestrian flow volumes in corresponding streets vary for different years, but the spatial relation between pedestrian distribution and land use organization has been quite steady. For example, high volumes of pedestrians have been associated with retailing trade, financial services, and other high-density service activities. Much lower pedestrian flows have been recorded in wholesale and residential areas.

With reference to these studies, a relative rank of functions was established and all activities in the land use classification are arranged in terms of their pedestrian generation effects (see Table 3-2). At this stage, this is the only way to establish a ranking scheme. Although it is rough, it provides a basis for a comparative study.

3.4.2 Measurement of Land Use Changes

To best reflect the land use changes during the study period, a systematic approach is necessary. That is, floor space for each functional category in each functional area should be calculated and compared to allow changes to be measured over each five-year period. However, the collection of accurate floor space data proved to be very difficult. The only place where these data are kept is the City Assessment Office, but it would have been far too time-consuming to consult the thousands of cards relating to the central area. The only practical alternative was to estimate floor space from the land use maps. The first round of calculation was based on lot areas, although this was known to be an exaggeration, because most buildings do not cover the whole lot or lots on which they are situated. The initial floor space measurements were therefore adjusted by a factor of 2/3, to generate a second round of calculations which were used in the analyses. No adjustment was made to single-family residences, parking facilities, and parks, because these activities, in most cases, occupy their complete sites

It must be acknowledged that the adjusted figures are still estimations, because not all buildings occupy exactly 2/3 of their sites. Furthermore, the determination of floor space share for different functions in highrise buildings has been somewhat arbitrary, because Henderson's Directories do not give any information on room size or the amount of floor space occupied by individual users. Nevertheless, the data are believed to make sense for this study. They are good enough to capture the general trends of land use change and the striking contrasts among functional areas.

3.5 Pedestrian Facility Classification and Measurement

Pedestrian facilities refer to various physical means and conveniences designed specifically for pedestrian use. As has been described in Chapter 2, facilities commonly provided for pedestrians in urban central areas include, in addition to walkways, pedestrian malls, parks and plazas, all of which are to be found in Edmonton's central area.

3.5.1 Pedestrian Facility Classification

As with land use studies, the first technical consideration for a systematic approach to the study of pedestrian facility development is

Table 3-3 Pedestrian Facility Classification

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1. walkway
   1.1 improved sidewalk
   1.2 skyway, including associated interior corridor (see definition in Section 2.2.4 of Chapter 2)
   1.3 underground pedway, including associated interior corridor
2. pedestrian mall
3. plaza
4. park

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to classify the different kinds of pedestrian facilities. Table 3-3 depicts the classification that has been developed for the thesis. It considers both function and physical form, but is limited to those facilities that have been identified in the Edmonton study area. Sidewalks, skyways, and underground pedways are grouped into one major category because they all function as pedestrian passages, although they have distinct physical forms. A pedestrian mall is distinct from all other pedestrian facilities. In addition to the functions of restricting automobile traffic and facilitating pedestrian movement, it also provides pedestrians with various amenities, such as shops, restaurants, commercial amusements, and other services. Although such amenities may also be available along some pedways, a pedestrian mall is still distinct from pedways in that, as has been defined in Chapter 2, it is a new kind of street oriented toward pedestrians. Parks and plazas, as defined in Chapter 2, should be regarded as different kinds of facilities. In Edmonton's central area, however, it is not always easy to differentiate them, as they sometimes perform similar functions, such as offering resting areas and providing spaces for outdoor celebrations, ceremonial events, and festivals. Still they are classified as two different kinds of facilities in this thesis because they have been named as either parks or plazas by the City, and are known to local citizens by their particular names. These names are based mainly on physical forms. Thus, to the landscape architects of the Edmonton Parks and Recreation Department, parks usually have "soft" surfaces of grass, and do not share consistent architectural characteristics with their adjacent buildings. Examples are Sir Winston Churchill Square, McDougall Park, and Beaver Hill Park. Plazas are mostly paved with hard materials in consideration of the architectural character of their adjacent buildings, as in the Public Library Plaza and the plaza in front of the Legislature Building. Moreover, although these public open spaces sometimes perform similar functions, they are by no means identical. For example, it is not common for parks to be used as through paths. Plazas, on the other hand, are often designed to include pedestrian paths to facilitate pedestrian movement, as can be seen in the Public Library Plaza and the Legislature Plaza.

In most cases, there is no problem defining particular pedestrian facilities in the study area, except for "improved sidewalks". As a matter of fact, there are sidewalks along all streets and avenues in Edmonton's central area, although they vary greatly in width, design style, and paving material. Some of them are old and worn out, such as those in the Boyle Street area and the wholesale-warehouse area. Others are relatively new and have been recently repaved, such as those in the provincial government centre. Yet even these newly-improved sidewalks show inconsistency in width, paving materials, and design style, and so look discontinuous. In 1983, when the City of Edmonton started to construct Rice-Howard Mall, new paving materials and construction standards were adopted for the improvement of downtown sidewalks. Subsequently, the Jasper Avenue Improvement Project and Heritage Trail both adopted the same style. In 1986, the City of Edmonton Planning Department proposed in the **Edmonton Downtown Design Improvement Manual** that all sidewalk improvements afterwards be encouraged to use "new urban design construction standards and details used in Rice-Howard Way, Jasper Avenue, and Heritage Trail and other projects" (Edmonton, 1986). The most obvious common characteristic of these projects is the use of red bricks as paving materials. In consideration of the variances among sidewalks, two criteria were employed to classify sidewalks as "improved": one is the design construction standards mentioned above; the other is overhead canopies. That is, only those sidewalks which either meet the proposed design standards or have canopies are classed as "improved sidewalks" in this study. Heritage Trail is planned as a city gallery, but because most of the proposed galleries have not materialized yet, the trail is treated in this study as an improved sidewalk only.

3.5.2 Measurement of Pedestrian facilities

The measurement of pedestrian facilities is another technical consideration. Because of the differing nature of the various pedestrian facilities (e.g. some of them are passages and take linear forms, others are recreation or resting areas and assume square forms), different measures have to be used for analytical purposes. As a result, two measures are used in this study: one is length in metres, used for walkways and pedestrian malls which take linear form; the other is area in square metres, applied to parks and plazas which assume square forms.

If a skyway or underground pedway connects two buildings, it is measured from the centre of one building to the centre of another to include the associated interior corridors. If two or more skyways, or underground pedways, connect more than two buildings to form a network, the total lengths of the pedways are calculated to include the whole widths of the buildings in between.

To complement the above measurements, the numbers of buildings that are connected by skyways or underground pedways are also counted to demonstrate the extension of pedway networks. Connection of individual facilities will be demonstrated with maps.

Chapter 4 Interpretation of Land Use Changes in the Study Area

As stated in Chapter 3, the study period 1966-1986 is divided into four five-year subperiods, while the study area is divided into seven functional areas which mostly fit the core-frame concept. This chapter will then offer an interpretation of land use changes in the study area in chronological sequence. The concrete approach is to measure the floor space changes for each functional category in each functional area and in the CBD as a whole. The ultimate purpose of this chapter is to show both the intensity changes and the spatial shift of objective demand for pedestrian facilities.

4.1 A Review of Land Use Changes Prior to 1966

Land use changes before 1966 are beyond the scope of this study, so they have not been explored in any depth. Still, it is desirable to set events in the study period in the context of long-term development trends, by describing the changes that occurred in the early post-war period. The source is Bannon's thesis, **The Evolution of the Central Area of Edmonton, 1946-1966.**

According to Bannon (1967), the central area of Edmonton has been expanding westward almost since the city's beginning. This expansion was particularly rapid after the Second World War, when floor space devoted to most commercial functions grew at the expense of residential and other non-central functions. Between 1946 and 1966, the total amount of floor space in the central area increased by 45.5 per cent, mostly in response to the growth of various services.

The expansion of the central area was both outward and upward, as multistorey buildings were constructed over a wide area. The increased demand for, and cost of, land in the CBD forced most non-central functions to relocate, most commonly to new sites in the frame. By 1966, the functional segregation of the frame and the core (CBD) was well established. The CBD was then characterized by a variety of retail and service uses, requiring close proximity to one another and serving the entire metropolitan area. The frame, on the other hand, was then occupied by nodes of wholesale, manufacturing, governmental and civic offices, and residences. Often, these uses could not afford and did not need a CBD location, but easy access to the CBD and to the rest of the city was a distinct advantage to them.

Bannon also found that although manufacturing, wholesale, and warehouse uses had all increased in the frame, this zone was losing its advantages for many businesses because of the high cost of land, inadequate space, and difficulties caused by high volumes of traffic. As a result, many firms had moved out of the central area altogether by 1966. Only wholesale firms without large storage requirements could find enough space within the central area.

With increasing use of automobiles, the area devoted to parking increased in all parts of the central area between 1946 and 1966. All available properties in or near the CBD, which had no buildings on them, were used for parking in 1966.

In general, by 1966, retail uses were clinging to Jasper Avenue and 101st Street, while various service activities were mainly distributed on the southern margin of the CBD and around the east end of Jasper Avenue. Wholesaling (with or without warehouses) and manufacturing were mostly concentrated in the northwestern part of the central area. Many of the buildings in the central area, or even in the CBD were still low walk-up structures, and there was little underground development. (See Figures 1-1 and 3.1.)

4.2 Land Use Changes, 1966-1971

4.2.1 Land Use Changes in Functional Areas

Between 1966 and 1971, the total amount of floor space in the central area increased by 12 per cent or 183,500m^2 (Table 4-1). In terms of functional areas, the greatest increases occurred in the CBD-commercial core, the provincial government centre, and the McKay Avenue area.

In the CBD-commercial core (Table 4-7), floor space for retail trade and financial services decreased by 8 per cent and 11 per cent respectively, but floor space for firm headquarters and business offices increased by 210 per cent or 75,700m^2. This increase mostly

Key to Functional Categories in Tables 4-1 to 4-9

1. retail trade
2. financial services
3. personal/medical/professional/hotel/entertainment services
4. firm headquarters and business offices
5. civic and governmental functions
6. recreation, institution, social services (non-profit)
7. parking
8. transportation, communication, utilities
9. residential activities
10. wholesale trade and warehousing functions
11. manufacturing
12. no activity

Table 4-1 Square Metre and Percentage Changes in Floor Space Used by Each Functional Category in the Whole Central Area

Function	1966-71		1971-76		1976-81		1981-86	
	m2	%	m2	%	m2	%	m2	%
1	+2400	+1	+6800	+4	+24600	+14	0	0
2	-7700	-11	+53500	+89	+47800	+42	+72500	+45
3	+31400	+14	+56700	+23	+86000	+28	+279500	+71
4	+50600	+44	+29600	+18	+117600	+60	-16500	-5
5	+51400	+23	+76600	+28	+72800	+21	+349000	+83
6	+44300	+29	+10900	+5	+30100	+15	-11300	-4
7	+68400	+41	+38400	+16	+25700	+9	-2700	-1
8	+18500	+59	+10800	+22	+12200	+20	+15200	+21
9	+4500	+2	+34400	+16	+27300	+11	-5500	-2
10	-63900	-49	-13900	-21	-23200	-44	-13200	-46
11	-10800	-52	-1100	-11	-3000	-33	-2500	-42
12	-5600	-20	+25300	+111	+90000	+188	-5900	-4
total	+183500	+12	+328000	+19	+507900	+25	+658600	+26

Source: Appendixes 2-6

Table 4-2 Square Metre and Percentage Changes in Floor Space Used by Each Functional Category in Boyle Street Area

Function	1966-71		1971-76		1976-81		1981-86	
	m2	%	m2	%	m2	%	m2	%
1	+1400	+11	-100	-1	+100	+1	+2000	+14
2	+400	+200	-100	-17	-500	-100	0	0
3	-1100	-8	+700	+7	-5100	-39	+900	+11
4	+100	+10	-1100	-100	+1700	+170000	-1400	-82
5	0	0	0	0	0	0	0	0
6	+500	+8	+100	+1	+1200	+17	-2700	-32
7	+1500	+17	+3600	+35	+400	+3	+6400	+44
8	+700	+70000	-700	-100	0	0	0	0
9	-5100	-28	-4600	-35	+1600	+18	-5100	-50
10	-800	-44	-300	-30	-700	-100	+300	+30000
11	-1400	-100	0	0	0	0	0	0
12	-800	-100	+2800	+280000	+900	+32	+1400	+38
total	-4600	-7	+300	+1	-400	-1	+1800	+3

Source: Appendixes 2-6

Table 4-3 Square Metre and Percentage Changes in Floor Space Used by Each Functional Category in Civic Centre

Function	1966-71		1971-76		1976-81		1981-86	
	m2	%	m2	%	m2	%	m2	%
1	-3100	-29	-1400	-18	-1800	-29	-1100	-24
2	0	0	+1200	+120000	+500	+42	+1400	+28
3	+2700	+6	+19700	+38	-3300	-5	-18500	-27
4	-1200	-100	0	0	+4900	+490000	-4900	-100
5	-10000	-27	+20800	+76	+11100	+23	+121600	+205
6	+27800	+327	-1200	-3	+17300	+49	-18400	-35
7	+13200	+145	+5000	+22	-8500	-31	-4500	-24
8	+800	+5	0	0	+700	+5	0	0
9	-6400	-18	+34700	+115	-2300	-4	-1100	-2
10	-2800	-82	-600	-100	0	0	0	0
11	-2700	-90	-300	-100	0	0	0	0
12	-5100	-76	+1600	+100	+19200	+600	+24700	+110
total	+13200	+7	+79500	+41	+37800	+14	+99200	+32

Source: Appendixes 2-6

Table 4-4 Square Metre and Percentage Changes in Floor Space Used by Each Functional Category in Wholesale-Warehouse Area

Function	1966-71		1971-76		1976-81		1981-86	
	m2	%	m2	%	m2	%	m2	%
1	+9000	+35	+8000	+23	+2300	+5	+1700	+4
2	+500	+100	+1500	+150	+1500	+60	-3500	-88
3	+7800	+28	-6300	-18	+11000	+38	+3500	+9
4	-5000	-22	-4500	-25	+6800	+50	-8300	-41
5	+4000	+29	+1000	+6	-500	-3	+45500	+246
6	+24000	+2400	-500	-2	0	0	+3500	+14
7	+9800	+26	+12700	+27	+12800	+21	+17200	+24
8	+10000	+400	0	0	+14500	+116	-13000	-48
9	-6000	-22	-8000	-37	+42000	+311	+4000	+7
10	-54200	-51	-10300	-2	-20500	-49	-9000	-42
11	-4000	-32	0	0	-3500	-41	-3500	-70
12	+10500	+700	+3000	+25	+8000	+53	+3500	+15
total	+6400	+2	-3400	-1	+74400	+26	+41600	+12

Source: Appendixes 2-6

Table 4-5 Square Metre and Percentage Changes in Floor Space Used by Each Functional Category in Provincial Government Centre

Function	1966-71		1971-76		1976-81		1981-86	
	m2	%	m2	%	m2	%	m2	%
1	-3200	-28	-300	-4	-200	-30	+2700	+35
2	+3000	+32	-2000	-16	-1200	-11	+2700	+29
3	+10300	+86	-4300	-19	-3000	-17	+2000	+13
4	-6500	-46	-5500	-73	+19500	+975	-20500	-95
5	+36000	+23	+63000	+33	+56700	+22	+105300	+34
6	-3500	-4	+1500	+2	+6000	+7	+13500	+15
7	+6000	+53	-11300	-65	+3000	+50	-3000	-33
8	+500	+50000	0	0	+1000	+200	+36200	+2400
9	-11500	-43	-11500	-74	-2500	-63	-1500	-100
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	-4500	-69	+11500	+575	-6000	-44	-6500	-86
total	+26600	+8	+41100	+11	+73300	+18	+130900	+27

Source: Appendixes 2-6

Table 4-6 Square Metre and Percentage Changes in Floor Space Used by Each Functional Category in McKay Avenue Area

Function	1966-71 m2	1966-71 %	1971-76 m2	1971-76 %	1976-81 m2	1976-81 %	1981-86 m2	1981-86 %
1	0	0	+2000	+200000	+1300	+65	-600	-18
2	-1500	-100	+1000	+100000	0	0	-1000	-100
3	-1500	-27	0	0	0	0	+8000	+200
4	-2000	-50	-2000	-100	0	0	0	0
5	+4500	+450000	+6500	+144	+10000	+91	-7500	-36
6	+1500	+10	+11500	+70	+2500	+9	-15500	-51
7	+5300	+530000	+2200	+42	-1500	-20	+800	+13
8	-1000	-100	0	0	0	0	0	0
9	+39500	+51	+13500	+12	+9500	+7	-3300	-2
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	0	0	+1000	+100	+5000	+250	-500	-7
total	+44800	+42	+35700	+24	+26800	+14	-19600	-9

Source: Appendixes 2-6

Table 4-7 Square Metre and Percentage Changes in Floor Space Used by Each Functional Category in CBD Commercial Core

Function	1966-71 m2	1966-71 %	1971-76 m2	1971-76 %	1976-81 m2	1976-81 %	1981-86 m2	1981-86 %
1	-7700	-8	-2900	-3	+32400	+39	-6200	-5
2	-5100	-11	+46900	+121	+19000	+22	+69900	+67
3	+1700	+3	+33400	+48	+88900	+86	+225600	+118
4	+75700	+210	+37700	+34	+54200	+36	+32100	+16
5	+11900	+78	-10200	-38	-5000	-29	+37600	+313
6	-2000	-8	-1000	-4	-900	-4	+9300	+44
7	+16900	+36	+32900	+51	+15800	+16	-14400	-13
8	+8000	+62	+7500	+36	-3000	-10	-5500	-22
9	-4000	-65	+15800	+718	-18000	-100	0	0
10	-6600	-52	-200	-3	+1000	+17	-4000	-57
11	-2700	-68	-800	-62	+500	+100	0	0
12	-2700	-31	+4400	+72	+18900	+1800	+9000	+31
total	+83400	+22	+163500	+36	+203800	+33	+353400	+43

Source: Appendixes 2-6

Table 4-8 Square Metre and Percentage Changes in Floor Space Used by Each Functional Category in CBD West Extension

Function	1966-71		1971-76		1976-81		1981-86	
	m2	%	m2	%	m2	%	m2	%
1	+6000	+40	+1500	+7	-9500	-42	+1500	+12
2	-5000	-42	+5000	+71	+28500	+238	+3000	+7
3	+11500	+26	+13500	+25	-2500	-4	+58000	+88
4	-10500	-28	+5000	+19	+30500	+97	-13500	-22
5	+5000	+500000	-4500	-90	+500	+100	+46500	+4650
6	-4000	-67	+500	+25	+4000	+160	-1000	-15
7	+15700	+30	-6700	-10	+3700	+6	-5200	-8
8	-500	-100	+4000	+400000	-1000	-25	-2500	-83
9	-2000	-13	-5500	-41	-3000	-38	+1500	+30
10	+500	+9	-2500	-42	-3000	-86	-500	-100
11	0	0	0	0	0	0	+1000	+100000
12	-3000	-100	+1000	+100000	+44000	+4400	-37500	-83
total	+13700	+7	+11300	+6	+92200	+43	+51300	+17

Source: Appendixes 2-6

Table 4-9 Square Metre and Percentage Changes in Floor Space Used by Each Functional Category in Whole CBD

Function	1966-71		1971-76		1976-81		1981-86	
	m2	%	m2	%	m2	%	m2	%
1	-4500	-4	+10700	+11	+24500	+22	-10600	-8
2	-3000	-5	+46100	+81	+42000	+41	+72900	+50
3	+4700	+3	+71000	+42	+115200	+48	+186200	+52
4	+54300	+66	+44900	+33	+90100	+50	+12200	+5
5	+13500	+450	+7000	+42	-10500	-45	+84100	+646
6	-9000	-29	+6500	+30	-900	-3	+8300	+30
7	+20200	+21	+41600	+36	+11200	+7	-9800	-6
8	+6400	+1280	-2400	-35	+23500	+522	-7500	-27
9	-11700	-39	+30300	+167	-7000	-14	-34900	-84
10	-12000	-77	+5500	+157	-5500	-61	-500	-14
11	-2200	-34	-4300	-100	+1000	+100000	+1000	+100
12	-6600	-67	+22800	+713	+43400	+167	-23500	-34
total	+50100	+8	+279700	+43	+327000	+35	+277900	+22

Source: Appendixes 2-6

resulted from the construction of three office towers: the 34-storey A.G.T Tower and the 26-storey Imperial Oil Building on the south side of Jasper Avenue, and the 18-storey Cambridge Building on the north side of Jasper Avenue.

In the provincial government centre (Table 4-5), the most apparent change was the expansion of governmental functions, with an increase of 36,000m^2 (23 per cent), due to the construction of the IBM Building and the Worker's Compensation Board Building. At the same time, residential uses decreased by 43 per cent or 11,500m^2.

In the McKay Avenue area (Table 4-6), the most obvious change was an increase of 39,500m^2 of floor space for residential uses, mainly resulting from the development of two apartment towers--Secord House and Avalon.

In the civic centre (Table 4-3), the construction of the public library and the art gallery marked the beginning of cultural facility development in this area. In addition, the old Woodward's warehouse and garage on 99th Street east of City Hall were demolished for a new court house, causing some eastward expansion of the civic centre.

Important land use changes in the CBD-west extension (Table 4-8) were the increase in service activities, such as personal and medical services (resulting from the development of the 14-storey Baker Centre), as well as parking spaces. At the same time, residential land uses were decreasing.

There was little change in total floor space in the wholesale-warehouse area. Nevertheless, the structural changes in this area were noteworthy (Table 4-4). Generally, the wholesale, warehouse, manufacturing, business office, and residential functions all decreased. As a result, vacant space and surface parking increased. In addition, institutional use, retail trade, and communication use expanded significantly. The increase of institutional use resulted mainly from the establishment of the 8-storey Alberta Vocational Centre. The increase of communication use was caused by the construction of the Edmonton Telephone Exchange Building. The increase of retail trade was mostly represented by the expansion of automobile dealers.

In the Boyle Street area, retail trade, institutional functions, and surface parking increased, mostly at the expense of residential uses (Table 4-2).

4.2.2 Change of CBD Boundaries and Land Use Changes in CBD

Figure 4-1 reveals that little change occurred to the CBD boundaries between 1966 and 1971. Two blocks were discarded, one to the north of Eaton's department store, the other west of the Bay. Both resulted from the vacation or demolition of buildings. As a result, the ground area of the CBD decreased by 9 per cent or 34,500m^2. At the same time, the total developed floor space increased by 8 per cent or 50,100m^2 (Table 4-9), which means that the CBD expanded vertically.

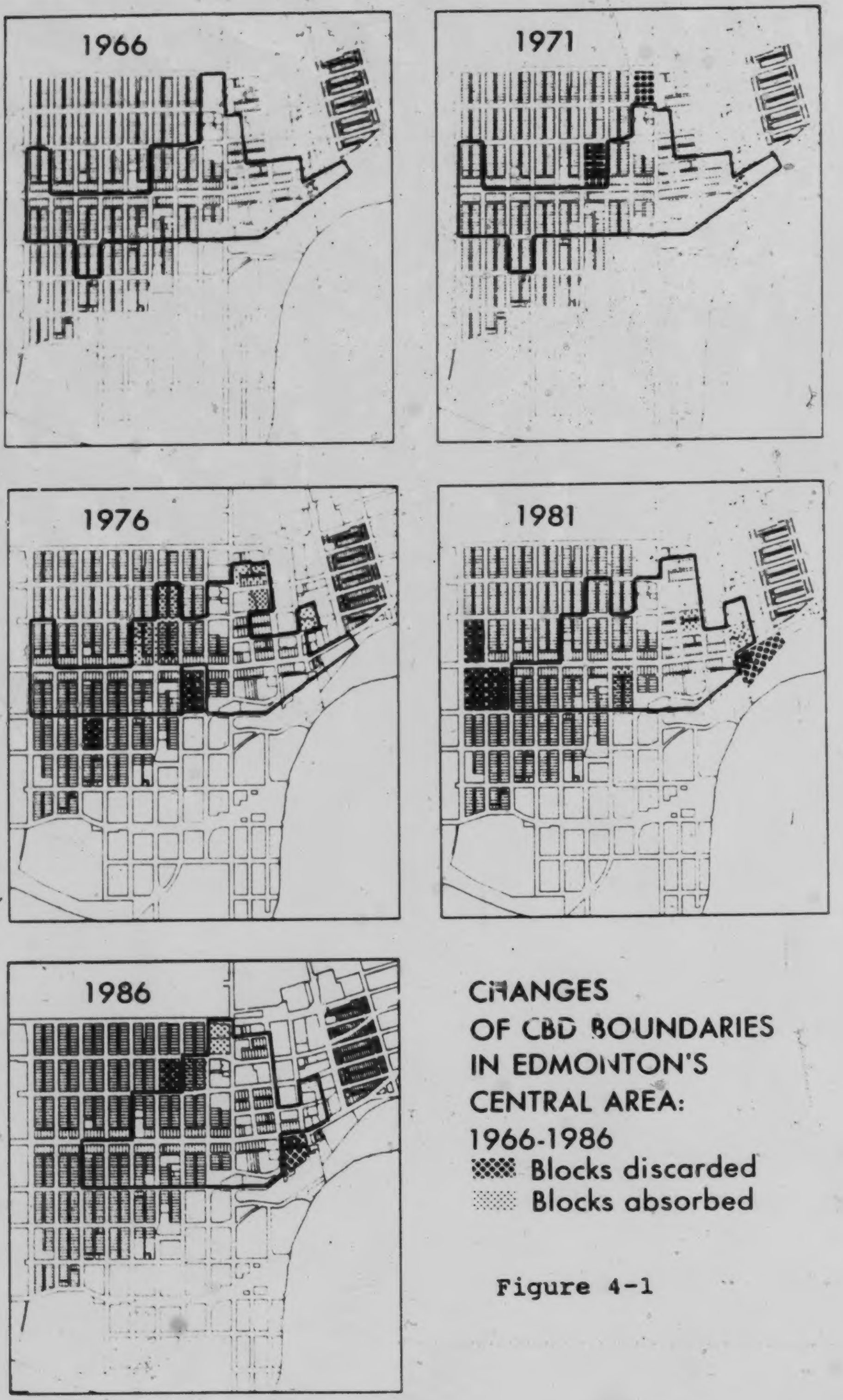
In terms of functional changes, the activities which have low pedestrian generation effects, such as wholesale, residential, and vacant space, all decreased in the CBD. In contrast, many kinds of services, firm headquarters and business offices, which have high pedestrian generation effects, increased significantly in terms of floor space (Table 4-9). At the same time, retail trade and financial services were observed to have shown a temporary decline.

4.3 Land Use Changes, 1971-1976

4.3.1 Land Use Changes in Functional Areas

During this five-year period, the total amount of floor space in the central area increased by 19 per cent or 328,000m^2 (Table 4-1). Increases occurred in most functional areas except for the wholesale-warehouse area and the Boyle Street area.

In the CBD-commercial core (Table 4-7), total floor space increased by 36 per cent or 163,500m^2. In terms of functions, financial services and business offices increased by 121 and 34 per cent, respectively (i.e. 46,900m^2 and 37,700m^2). This was mostly due to the erection of the 25-storey Royal Trust Tower and the 29-storey Toronto Dominion Bank Tower at Edmonton Centre, as well as the development of the Canada Permanent Trust Building and the 20-storey Capitol Square on Jasper Avenue. Other services, such as hotels,



CHANGES
OF CBD BOUNDARIES
IN EDMONTON'S
CENTRAL AREA:
1966-1986

▩ Blocks discarded
▨ Blocks absorbed

Figure 4-1

theatres, and commercial clubs, increased by 48 per cent, because of the development of the Westin Hotel and the Citadel Theatre. Residential uses also showed an increase, caused by the construction of the Alberta Place apartment building. The most significant commercial development was Edmonton Centre, which opened in 1974 with more than 100 shops and service outlets. This project resulted in the demolition of the old Edmonton Court House, and consolidated two small blocks into a large one by closing 100A Street between 102nd and 103rd Avenues. Parking spaces also increased, as a consequence of the construction of the 10-storey Edmonton Centre parkade.

In the civic centre (Table 4-3), total floor space increased by 41 per cent or 79,500m^2. Most of this increase went to governmental and civic functions, business firms, and residential uses. The new Provincial Law Court building opened in 1972. Then in 1975, the 22-storey Century Place was erected east of Chancery Hall and, like it, mostly accommodated business firms at that time. Also in this period, the 27-storey Macdonald Place was developed east of the Macdonald Hotel, with about 200 apartment units. Meanwhile, manufacturing, wholesale, and warehouse functions were diminishing in the civic centre, and small retail stores were disappearing.

Evident land use changes also occurred in the provincial government centre (Table 4-5). Total floor space there increased by 11 per cent or 41,100m^2, most of it accounted for by the expansion of governmental functions. Four office towers were completed: Petroleum Plaza South and North (both 14 stories), Jarvis Building (11 stories), and the Annex to the Financial Building (11 stories). All four were mostly occupied by government agencies. Four other office projects were still under construction in 1976, and contributed to the erosion of residential uses and surface parking which decreased by 11,500m^2 (74 per cent) and 11,300m^2 (65 per cent) respectively in this period.

The McKay Avenue (Table 4-6) area also experienced extensive redevelopment from low-density housing to high-density apartment towers. The area's proximity to the central core and the provincial government centre were the primary reasons. Two projects completed during this period were the 18-storey Mackenzie Tower and the 21-

storey Macdonald Tower, which caused an increase of 13,500m^2 of floor space for residences. Welfare organizations also expanded, resulting from the development of the YWCA Home.

In the area of the CBD-west extension (Table 4-8), the most striking changes were the increase of hotel/personal/professional services, financial services, and business firms. The main developments that contributed to this trend were the 5-storey Ambassador Hotel, the 8-storey Northwoods Inn, the 12-storey Bank of British Columbia, and the 9-storey Liberty Building. Retail trade showed a slight increase because the ground floors of some of the new office buildings were devoted to shops.

Floor space for most functions in the wholesale-warehouse area (Table 4-4) decreased during this period. As a result, surface parking and vacant space increased.

Residential uses in the Boyle Street area continued to decrease (Table 4-2). Houses were either demolished for temporary parking or left vacant .

4.3.2 Change of CBD Boundaries and Land Use Changes in CBD

During this period, the CBD boundaries underwent some obvious changes (Figure 4-1). Six blocks, all north of Jasper Avenue, were assimilated into the CBD, resulting from the development of Northwood Inn hotel, Edmonton Centre and its 10-storey parkade, and the Citadel Theatre, as well as the conversion of the Boardwalk from a wholesale-warehouse building into business offices. At the same time, two blocks south of Jasper Avenue were discarded from the CBD due to the development of Alberta Place, a residential highrise, and the construction of the Jarvis Building and the Financial Building Annex which were mostly occupied by governmental functions. On balance, however, the ground area of the CBD increased by 24,900m^2.

Vertical expansion was even more significant than horizontal change in the period 1971-1976 (Table 4-9). The total floor space of the CBD increased by 43 per cent or 279,700m^2. In terms of functions, retail trade, financial services, business offices, and hotel/personal /professional services, which have the greatest pedestrian generation effects, had a larger share of the total increase than other activities. For example, the floor space for the above four categories together increased by 172,700m^2, accounting for 62 per cent of the total increase in the CBD. Residential uses also increased because of the construction of the Macdonald Place apartment building. Besides, vacant floor space increased by 22,800m^2, as a sign of transition from one activity to another.

4.4 Land Use Changes, 1976-1981

4.4.1 Land Use Changes in Functional Areas

The pace of land use change accelerated after 1976. During the next 5 years, the total amount of floor space in the central area increased by 25 per cent or 507,900m^2 (Table 4-1). This increase was shared by all functional areas except the Boyle Street area.

In the CBD-commercial core (Table 4-7), total floor space increased by 33 per cent or 203,800m^2. Retail trade, finance, business firms, and other services continued to expand, accounting for 95 per cent of the total increase in floor space of this area. At the same time, governmental functions, institutional use, transportation, and residences all decreased. Around Edmonton Centre, the most significant developments were Oxford Tower (29 stories), the Continental Bank Building (18 stories), and the Four Seasons Hotel (27 stories). South to Edmonton Centre at the northeast corner of Rice-Howard Way, another 20-storey office tower—the Phipps Mckinnon Building—was erected, becoming a pioneer redevelopment project in Rice-Howard Way. These office towers mostly accommodated small business firms, financial activities, and professional services. They also contained small shops on their ground floors or in their underground concourses. East of the Westin Hotel, two other office towers—Sunlife Place (25 stories) and Nova Building (16 stories)—were completed for financial offices, firm headquarters, and other professional services. Another notable change was the relocation of the Greyhound Bus Station. The old terminal had been on the corner of 102nd Avenue and 102nd Street, immediately west of Eaton's department store. With the expansion of CBD-type activities in this direction, the station (a non-CBD use) was relocated two blocks away, to a site between 103rd and 104th Streets. The old site was still idle in 1981. Residential uses decreased because Alberta Place was converted from apartments to an apartment hotel.

Extensive changes also occurred in the area of the CBD-west extension (Table 4-8). Total floor space of this 6-block area increased by 43 per cent or 92,200m^2, caused by the construction of highrise office towers, such as Corner Point Building (10 stories), Principal Plaza (31 stories), A.E. LePage Building (23 stories), and Standard Life Centre (20 stories). As a result, financial services and business offices expanded by 28,500m^2 and 30,500m^2, respectively. On the other hand, retail trade uses decreased as many small on-street shops were eliminated to be replaced by the vast lobbies and concourses of the new office towers. Because most of these highrise towers were completed around 1980 and were not fully occupied by 1981, the vacancy rates were quite high at that time.

In the civic centre (Table 4-3) as well, retailing and surface parking were diminishing, giving way to governmental and civic functions. During this period, the civic centre was expanding both eastward and southward. Immediately north of the Provincial Law Court, an addition was under construction at the expense of surface parking. Further northeast, the Remand Centre was completed and construction began on the new Police Headquarters, which caused civic functions to expand over 97th Street for the first time. In the south, across Jasper Avenue, the construction of a convention centre, which started in 1980, eliminated all the small businesses on the site. As a result of these development, retail trade, surface parking, and residential uses in the civic centre decreased by 12,600m^2. Because most of the projects described above had not been completed by 1981, however, the floor space for governmental and civic functions did not increase significantly.

The provincial government centre (Table 4-5) experienced the most substantial land use changes in its history. Seven more office buildings were completed on land that had previously been used for residences and surface parking. These buildings were: Centre West (12 stories), Seventh Street Plaza (consisting of two 13-storey buildings), Victoria Place (9 stories), 108th Street Building (11 stories), 109th Street Building (13 stories) and Essex Building (13 stories). Together, they caused a great increase in floor space for governmental functions and business offices, and led to a further northward expansion of government uses. In addition, an extensive program for the beautification of the Legislature Grounds, which was devised at the height of Edmonton's boom period in 1979, was implemented. This project moved all surface parking stalls into two underground garages, while the surface was landscaped for ornamental and recreational purposes.

The McKay Avenue area (Table 4-6) maintained its high-density residential character between 1976 and 1981. Another 14-storey apartment building, McDougall Place, was constructed and floor space for residences continued to increase. Governmental functions also increased, as a result of the occupation of the Oxford Building by government agencies.

In the wholesale-warehouse area (Table 4-4), manufacturing and wholesaling activities dropped by another 3,500m^2 and 20,500m^2, respectively. At the same time, business firms and professional services expanded by 17,800m^2, mostly through the conversion of former wholesale-warehouse buildings into offices and the development of the 13-storey Energy Square on Jasper Avenue. Retail space also increased, mainly because of the introduction of new restaurants and furniture stores in this area, as well as expansion by automobile dealers. In addition, the development of the 14-storey Hillsborough Place on 109th Street caused a great increase of floor space for residential use.

In the Boyle Street area (Table 4-2), residential uses had a slight increase, but wholesaling and services (except for small business firms and surface parking) showed a negative change.

Another less discernible but important land use change in the central area was the construction of the first phase of Edmonton's LRT line and stations. The LRT excavation actually started in 1974, but service was not begun until 1978. An underground form was adopted for the downtown section of the LRT system, and about 1.5km of subways was built under the CBD-commercial core and the civic centre in the first phase.

4.4.2 Change of CBD Boundaries and Land Use Changes in CBD

The CBD boundaries once again showed some obvious changes during this period (Figure 4-1). In the western part of the CBD, three blocks were discarded because of the northward expansion of governmental functions in the provincial government centre, and the development of the Hillsborough Place, a residential project. In the eastern part of the CBD, two blocks were assimilated, resulting from the development of the Phipps-McKinnon Building in Rice-Howard Way and the construction of Sunlife Place and the Nova Building, east of the Westin Hotel. South of Jasper Avenue, one block was discarded because of the construction of the Edmonton Convention Centre; another block was absorbed back into the CBD due to the conversion of Alberta Place into an apartment hotel.

As a result of the boundary changes, the ground area of the CBD contracted by 20,800m^2. Once again, however, as in 1966-1971, the total CBD floor space increased by 35 per cent or 327,000m^2 (Table 4-9). The functions of retailing, finance, business offices, and personal/professional services were the main contributors, accounting for 83 per cent of the increase in total floor space. At the same time, wholesale trade, governmental functions, and residential uses all decreased.

The above land use changes contributed to the further intensification of the CBD and increased its concentration of those activities that depend on face-to-face contacts. By contrast, functions that have low pedestrian generation effects continued to decrease in the CBD.

4.5 Land Use Changes, 1981-1986

4.5.1 Land Use Changes in Functional Areas

Extensive land use changes continued in Edmonton's central area after 1981. Total floor space increased by 26 per cent or 658,600m^2

during this period (Table 4-1).

In the CBD-commercial core (Table 4-7), total floor space increased by 43 per cent or 353,400m^2. Most of the increase was accounted for by financial services, firm headquarters and business offices, personal/medical/professional services, and governmental functions, while floor space for transportation, wholesale trade, and surface parking decreased. Retail space also contracted during this period. Numerous development projects were associated with the above land use changes. Northwest of Edmonton Centre, the 34-storey Canada Trust Tower with its adjacent Centre Club was completed in 1982 for financial and professional services and business offices. Southwest of Edmonton Centre, the 36-storey Manulife Place was erected for business firms, and financial and professional services. This tower rises from a two-storey podium which incorporates an enclosed shopping mall. South of Edmonton Centre, the old Tegler Building and Zeller's department store were demolished, and a new Bank of Montreal building was developed on that site. Still further south, between 101A Avenue and Jasper Avenue, Scotia Place with its twin skyscrapers, was opened for business in 1983 and became another important development along Rice-Howard Way. The complex retained the Scotia Bank on the ground floor, but accommodated many other financial services, professional services, and business firms on the upper floors. On the south side of Jasper Avenue, the most significant development completed during this period was the 30-storey IPL Tower, which is used mostly for financial services and firm headquarter offices.

In the CBD-west extension (Table 4-8), total floor space increased by 17 per cent or 51,300m^2, resulting from the development of Notlem Building (5 stories), First Edmonton Place (14 stories), and Canadian Utilities Centre (20 stories). The most substantial functional changes were decreases in business firms and vacant space (13,500m^2 and 37,500m^2, respectively), and increases in personal/professional/business services (58,000m^2) and governmental functions (46,500m^2). Retail trade and financial services also showed a slight increase. The floors in Principal Plaza and Standard Life Centre that had still been vacant in 1981, were mostly occupied by 1986.

Land use changes also occurred in the civic centre (Table 4-3). In 1982, the Edmonton Police Department moved into its new headquarters at 96th Street and 103A Avenue, leaving the former building on Sir Winston Churchill Square vacant. The Provincial Law Court Annex opened in 1983, adding 38 court rooms and other judicial facilities. Also in 1983, the Edmonton Convention Centre was completed. In 1985, another 10-storey building, the John E. Brownlee Building, was constructed to the east of the Federal Post Office Building, across 97th Street. This building houses offices for the departments of Alberta Solicitor-General and Attorney-General. The development of this whole block caused the civic centre to encroach into the Boyle Street area. Governmental and civic functions increased greatly (121,600m^2), but business firms and professional services decreased as they were replaced by civic uses in Century Place. Other services decreased because the Macdonald Hotel was taken out of use for renovation. Vacant land increased greatly as well, as a large site was cleared for the construction of Canada Place at the east end of Jasper Avenue. By 1986, governmental and civic functions accounted for 45 per cent of the total floor space in Civic Centre.

In the provincial government centre (Table 4-5), total floor space increased by 130,900m^2 (or 27 per cent), resulting from the completion of four office towers. The first three (Kensington Place, Bramalea Building, and Sterling Place) mostly house governmental uses, while the fourth (44 Capital Boulevard) is almost completely occupied by Edmonton Telephones. As a result, government functions increased by 105,300m^2, and communications by 36,200^2. Institutional land use also increased (13,500m^2), as office space in the north tower of Seventh Street Plaza was converted into the downtown campus of the Grant MacEwan College. At the same time, surface parking and vacant floors decreased, and residential uses diminished to zero.

Manufacturing, transportation, and wholesale trade continued to decrease in the wholesale-warehouse area (Table 4-4). Surface parking and vacant floors in turn increased. During this period, the most obvious changes in this area have been the conversion of the Revillon and Boardwalk Buildings into civic agency offices housing the City

Planning Department and the Parks and Recreation Department, and the demolition of the old Greyhound garage. As a result, floor space for civic functions increased by 45,500m^2.

Little change occurred in the Boyle Street area (Table 4-2) and the McKay Avenue area (Table 4-6) during this period. In the Boyle Street area, residential uses continued to be transformed into surface parking. In the McKay Avenue area, no new residential development took place, and there was even some decrease in residential floor space.

4.5.2 Change of CBD Boundaries and Land Use Changes in CBD

Once again, the CBD boundaries shifted in response to land use changes (Figure 4-1). In the northern part of the CBD, one block was discarded because of the conversion of the Revillon and Boardwalk buildings from business firms into civic department offices, but two other blocks northwest of Edmonton Centre was assimilated into the CBD following the construction of the Canada Trust Tower and the development of the Eaton Centre. In the eastern part of the CBD, south of Jasper Avenue, one block was dropped temporarily from the CBD while the Macdonald Hotel was being renovated. The net outcome was a small decrease (2,250m^2) in CBD ground area.

Total floor space, on the other hand, increased by 277,900m^2 (Table 4-9). All kinds of services expanded greatly except for parking. Governmental functions also increased significantly, as the upper floors in three buildings (Capitol Square, Standard Life Centre, and Bank of British Columbia) were occupied by government agencies. In contrast, transportation and communication uses, surface parking, residences, and vacant floors in the CBD all decreased. Retail space also showed a negative change.

4.6 Summary and Implications

This chapter has presented a description of land use changes in the central area of Edmonton during the period 1966-1986. The general trend of the land use changes fits well with the expectations set out in Chapter 2.

To summarize, it was determined that urban central areas in North

American cities are mostly organized in a core-frame structure. The core (CBD) is an exceptionally limited area of very high land value upon which most of the downtown retail and service (financial, professional, personal, business offices, and hotel) uses are concentrated. The frame is a diverse area surrounding the core and is occupied mostly by non-retail and non-financial activities, such as off-street parking, warehousing, light manufacturing, wholesaling, transportation terminals, multi-family residences, and governmental functions. Because of the diversification in land use, the frame is often readily differentiated into functional areas.

In terms of land use change, the core is highly dynamic. During the past 50 years or so, the most striking phenomenon affecting core areas has been their functional shifts and resultant land use changes. The literature review revealed that most North American cities have experienced a decline in retailing and a parallel boom in service employment in their cores. As a result, the core has typically become more specialized in three dominant groups of activities: 1) financial services, 2) specialized retailing, and 3) various other services, including business offices, personal/professional services and hotels. These activities all need high levels of face-to-face contact, and thus generate large numbers of pedestrian trips per unit area. Physically, the core tends to expand both outward and upward. Horizontal expansion is usually moderate. The boundaries of the core do not move uniformly, but rather advance along certain fronts and retreat along others. In general, vertical expansion is more significant, giving rise to tight clusters of skyscrapers so that walking distances in the core can be reduced by using elevators.

The frame has also experienced land use changes. Generally, manufacturing, wholesaling, and warehousing functions moved out and were replaced by other activities. Yet there were still differences among functional areas, some of which expanded outward vigorously, while others were generally inactive.

All these tendencies are true of Edmonton's central area. First, it can be explicitly divided into a core and a frame, both of which can be further divided into functional areas, according to their basic activities and their particular land use organization. During the period 1966-1986, extensive land use changes occurred in most parts of the central area. Functional areas became more specialized in their basic activities, except for the Boyle Street area and the wholesale-warehouse area (Table 4-10).

Over the twenty-year study period, the total amount of floor space in the central area doubled, with an increase of 1,600,000m^2. The greatest increases occurred in the categories of personal and professional services and civic and governmental functions (Figure 4-2). In terms of functional areas, the CBD (especially the CBD-commercial core) experienced the greatest amount of change, resulting mainly from its vertical expansion. Most notably, the floor space devoted to various services (excluding parking) in the CBD increased by 240 per cent. Moreover, although the total area for retail use increased by only 20 per cent, the CBD still has the greatest number and variety of shops in the central area. In addition to its vertical expansion and structural change, the CBD experienced horizontal movement. Generally, it retreated in its southwestern part because of the northward expansion of the provincial government centre, but advanced in its northeastern part, in close association with the redevelopment of the civic centre.

In the frame generally, land use changes were uneven. The provincial government centre and the civic centre were sectors of active assimilation and experienced more changes than other functional areas in the frame. As a result, they became more specialized in governmental and civic functions (Table 4-10), which also have relatively high pedestrian generation effects. The McKay Avenue area remained a residential neighborhood, but experienced extensive transformation from low-density housing to high-density apartment buildings. The wholesale-warehouse area and the Boyle Street area experienced the least land use change of all. In the wholesale-warehouse area, the most discernible changes were the decreases in floor space for wholesale, warehouse, and manufacturing activities. Although other activities have moved into this area, such as automobile dealers, and hardware and furniture stores, the amount of

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Table 4-10 Percentage of Floor Space for Different Functions in the Central Area of Edmonton (1966 and 1986)

Function	Whole Central Area		Boyle Street Area		Civic Centre	
	1966	1986	1966	1986	1966	1986
1	11.1	6.3	19.5	25.8	6.0	0.8
2	4.4	7.2	0.3	0.0	0.0	0.9
3	14.2	21.1	20.7	14.3	27.1	12.1
4	7.6	9.2	1.5	0.6	0.6	0.0
5	14.4	24.1	0.0	0.0	20.8	44.1
6	9.9	7.1	10.1	9.1	4.7	8.3
7	10.9	9.1	13.6	33.3	5.1	3.5
8	2.1	2.8	0.0	0.0	8.1	3.9
9	13.6	8.4	28.2	8.1	20.3	14.9
10	8.5	0.5	2.8	0.6	1.9	0.0
11	1.4	0.1	2.1	0.0	1.7	0.0
12	1.9	4.1	1.2	8.2	3.7	11.5
total	100.0	100.0	100.0	100.0	100.0	100.0

Function	Wholesale-warehouse Area		Provincial Govt Centre		McKay Avenue Area	
	1966	1986	1966	1986	1966	1986
1	9.3	11.8	3.4	1.7	0.0	1.4
2	0.2	0.2	2.8	2.1	1.4	0.0
3	9.8	10.9	3.6	2.8	5.2	6.2
4	8.2	3.1	4.2	0.2	3.8	0.0
5	4.9	16.1	46.1	68.2	0.0	7.1
6	0.4	7.1	26.5	17.5	14.1	7.8
7	13.4	22.4	3.4	1.1	0.0	3.5
8	0.9	3.5	0.0	6.2	0.9	0.0
9	9.8	14.8	8.1	0.0	73.7	70.6
10	38.1	3.1	0.0	0.0	0.0	0.0
11	4.5	0.4	0.0	0.0	0.0	0.0
12	0.5	6.6	1.9	0.2	0.9	3.4
total	100.0	100.0	100.0	100.0	100.0	100.0

(continued on next page)

(Table 4-10 continued)

Function	CBD Commercial Core		CBD West Extension		Whole CBD	
	1966	1986	1966	1986	1966	1986
1	25.1	9.3	7.9	4.1	17.3	8.1
2	11.7	14.8	6.3	12.1	10.1	14.2
3	18.1	35.4	22.9	34.6	27.2	35.2
4	9.6	19.9	19.5	13.5	13.7	18.5
5	4.1	4.2	0.0	13.3	0.5	6.3
6	6.6	2.6	3.2	1.5	5.1	2.3
7	12.7	8.4	27.2	16.6	15.6	10.3
8	3.5	1.7	0.3	0.1	0.1	1.3
9	1.7	0.0	8.2	1.8	5.1	0.4
10	3.4	0.3	2.9	0.0	2.6	0.2
11	1.1	0.1	0.0	0.3	1.1	0.1
12	2.4	3.3	1.6	2.1	1.6	3.1
total	100.0	100.0	100.0	100.0	100.0	100.0

(Source: Appendices 2-6)

Key to Functional Categories

1. retail trade
2. financial services
3. personal/medical/professional/hotel/entertainment services
4. firm headquarters and business offices
5. civic and governmental functions
6. recreation, institution, social services (non-profit)
7. parking
8. transportation, communication, utilities
9. residential activities
10. wholesale trade and warehousing functions
11. manufacturing
12. no activity

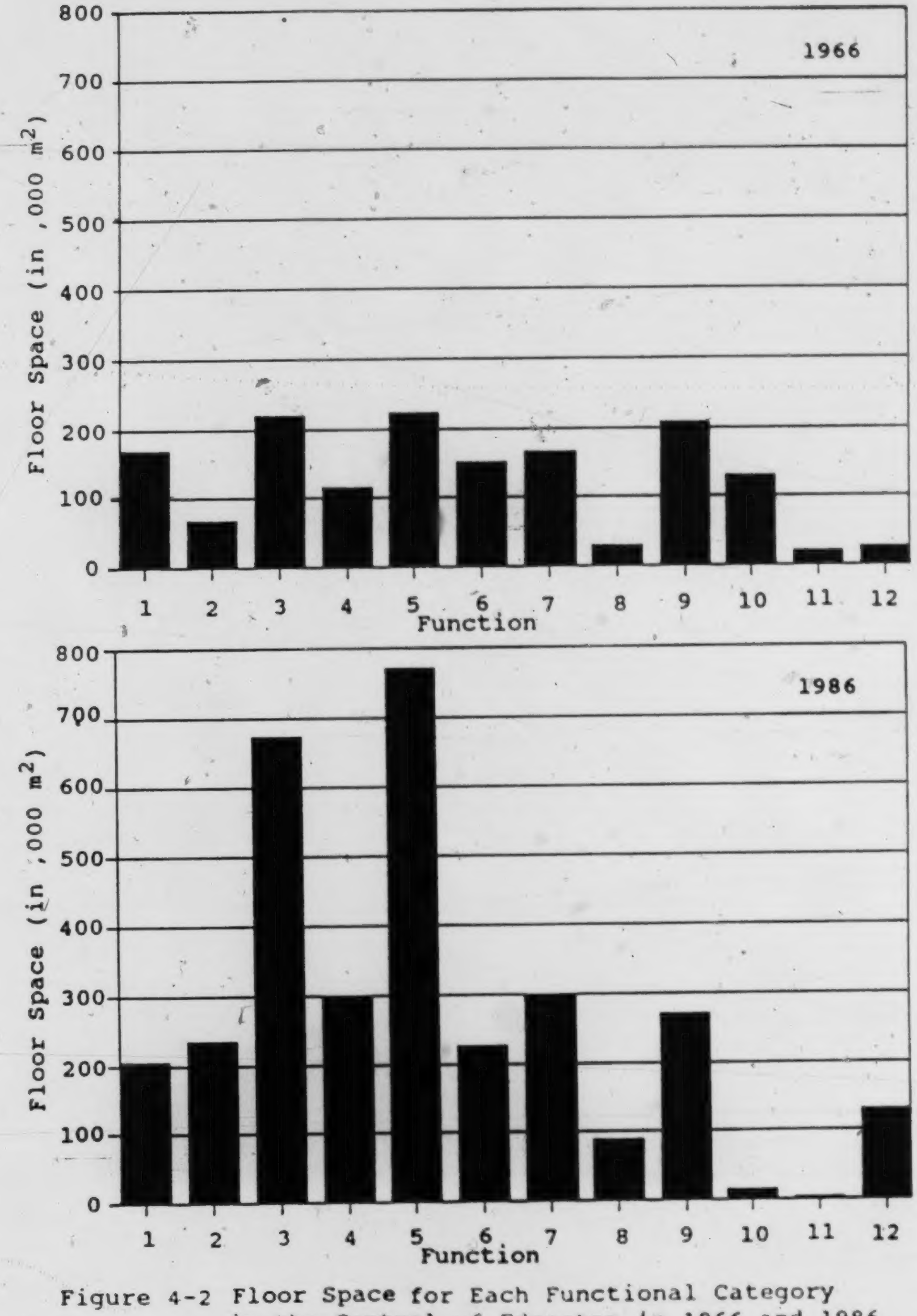


Figure 4-2 Floor Space for Each Functional Category in the Central of Edmonton in 1966 and 1986 (Key to Functional Categories is the Same as Those on Page 83 for Table 4-10)

vacant space remains high. In particular, large areas of land are being used for temporary parking. The Boyle Street area is a sector of general inactivity, according to Griffin and Preston's (1966) model. The only important land use changes there were the decrease in floor space for residences and the increase in floor space for surface parking.

From the viewpoint of a pedestrian study, the first important finding from the analysis of land use change is that those activities, other than retailing, that have the highest pedestrian generation effects have expanded significantly in the central area of Edmonton, whereas the activities that have lowest pedestrian generation effects have either decreased or shown a minor increase (Figure 4-2). For example, the total floor space for the first five functional categories in Table 3-2 increased by 204 per cent or 1,384,600m^2 between 1966 and 1986; the floor space for all other functional categories increased by only 40 per cent or 293,400m^2. As a result, the functional structure of the central area was strikingly changed (Table 4-10). The greatest changes occurred after 1976, and especially after 1981. For instance, in the ten years 1976-1986, the increase in floor space for the above five functional categories in the central area was 3 times that for the previous ten years.

Second, in terms of functional areas, the CBD (especially the CBD-commercial core) had the largest increase in floor space for the first five functional categories. The provincial government centre and the civic centre also had large increases in floor space for these activities. This implies that the objective demand for pedestrian facilities in these areas was greatly enhanced or intensified. Besides, there were also spatial shifts in objective demand. For example, as the CBD advanced northeastward, the locus of objective demand was shifting in the same direction, caused by the development of Edmonton Centre, the Four Seasons Hotel, the Oxford Tower, and the Canada Trust Tower. The northward expansion of governmental functions in the provincial government centre and the eastward expansion of civic and governmental functions in the civic centre, which were both at the expense of single housing, surface parking and low-density

Table 4-11 Spatial Distribution of the Floor Space for the First Five Functional Categories in Table 3-2, 1966-1986

Functional Area	1966	1971	1976	1981	1986
Boyle Street Area	3.5	3.1	2.4	1.6	1.2
Civic Centre	12.4	9.4	11.1	9.3	10.9
Wholesale Area	11.5	11.6	9.3	8.6	7.7
Government Centre	25.4	26.1	25.5	24.3	20.9
McKay Avenue Area	1.4	1.2	1.6	2.0	1.3
CBD Core	32.3	36.2	38.3	42.0	45.2
CBD Extension	13.5	12.4	11.8	12.2	12.8
Whole CBD	52.2	52.0	57.5	61.6	58.1
Whole Central Area	100.0	100.0	100.0	100.0	100.0

Source: Appendices 2-6

buildings, also caused spatial shifts of objective demand for pedestrian facilities.

Third, from Table 4-11, it can be seen that the rank of the functional areas in terms of floor space share for the first five functional categories in Table 3-2 did not change over the 20-year period. The CBD-commercial core continued to have the greatest share of the floor space in the central area for these activities, and the share has been increasing. The next important functional areas that also had relatively bigger shares of the floor space for these activities were the provincial government centre, the CBD-west extension, and the civic centre. In addition to the very slight land use changes, the Boyle Street area and the wholesale-warehouse area had the smallest share of the floor space for the same activities in Table 3-2.

Because the first five functional categories in Table 3-2 have high pedestrian generation effects, and the CBD, the civic centre, and the provincial government centre have bigger shares of the floor space in the central area for these activities than other functional areas, the trends of the land use in Edmonton's central area imply that more pedestrian trips were generated and concentrated in these functional areas, especially in the CBD-commercial core. The objective demand for pedestrian facilities in the above functional areas are, therefore, much higher than other functional areas. This can be verified by Figure 2-3 that presents the pedestrian flow pattern in Edmonton's central area for 1987. It is expected that the CBD, the civic centre, and the provincial government centre should have received the highest priority in the planning and development of pedestrian facilities, particularly after 1976. The Boyle Street area, the wholesale-warehouse area, and the McKay Avenue area have a much smaller share and increase of floor space in the central area for the same five functional categories in Table 3-2. These functional areas should possess fewer pedestrian facilities than other functional areas because the objective demand there is low.

Chapter 5 Planning and Development of the Pedestrian Facility System in Edmonton's Central Area

As has been stated previously, there are generally two forces for pedestrian facility development: one is objective demand, which is a function of land [illegible] the other is conscious planning, which should be the policy response to objective demand. In chapter 4, it was demonstrated that land use changes have brought about changes in intensity and spatial shift of objective demand for pedestrian facilities in Edmonton's central area. By itself, however, objective demand does not produce facilities. It is through the implementation of official planning policies that substantial development of pedestrian facilities is secured. As the central theme of the thesis, this chapter will examine the formulation of planning policies and the actual development of the pedestrian facility system in Edmonton's central area by following the same time sequence and the same geographical frame of functional areas as in Chapter 4. This will make it possible to determine how well the planning policies have responded to land use changes, and the spatial shift of objective demand for pedestrian facilities, in central Edmonton.

5.1 A Brief Review of Pedestrian Facility Planning and Development before 1966

Apart from the sidewalks along major streets, the development of pedestrian facilities in the central area of Edmonton has long been a public concern, going back as far as the earliest plans for a civic centre in 1912. At that time, a firm of landscape architects, Morrell and Nicholls of Minneapolis, was employed to design the area between 99th and 100th Streets and 103rd Avenue and the lane which separated this block from that fronting 104th Avenue (Figure 1-4). The site was to comprise a plaza or open space, surrounded by various buildings of a public or semipublic nature. But due to the City's inability to raise funds for land assembly, the civic centre concept remained dormant for many years (Dale, 1970; Edmonton, 1979b).

Later civic centre plans submitted by Burgess and Dewar and by Detwiler, in 1947 and 1950 respectively, expressed this idea more clearly. For example, the chief elements of the Detwiler Plan were an auditorium, a public museum and an art gallery, covered and protected sidewalks, and an underground walk and arcade to the C.N.R. station. But because the ratepayers voted against the scheme through fears of increased taxation, the plans were again shelved.

In 1961 came the Webb and Knapp Plan which proposed large-scale development to include department stores and tree-lined pedestrian shopping promenades at several points within the civic centre. In this plan, traffic was to use a distributor ring road, thus avoiding the heart of the district. However, the City Commissioners recommended against the plan. Then, a modified Civic Centre Development Plan was adopted by Council in 1962. One of the elements of this plan was an ornamental park between 99th and 100th Streets (Dale, 1970).

In 1965, the City dedicated the proposed park to honour Sir Winston Churchill. Subsequently, Maxwell Cummings and Sons of Montreal presented to Council a proposal to develop a shopping plaza under the park, complete with gallery and malls, the whole designed to serve the public and to be maintained by the City. Council approved the proposal in principle, but the company failed to present a final plan within the agreed six-month deadline (Dale, 1970; Edmonton, 1979b).

Almost in parallel with the Civic Centre Development Plan, a technical study called "An Evaluation of the Needs of the Pedestrian in Downtown" was carried out in 1963 by Hill, Bakker, and Akers. They conducted pedestrian surveys through a combination of on-street interviews and at-surface counts, and then employed gravity-model techniques to estimate pedestrian flows and generation rates of different land use types. Because of data limitations (the surveys were done at a limited number of locations), the pedestrian flow pattern depicted in this study was no more than an estimated projection. Nevertheless, the authors' plan for the future development of pedestrian facilities is worthy of notice. In the area west of 100th Street, they recommended, as a long term solution, that an uninterrupted pedestrian system should be planned at a second level by linking the major department stores, such as Eaton's, Woodward's and the Bay, with enclosed overhead bridges. For the civic centre, the study recommended that an underground pedestrian network would be more suitable. This is the earliest recorded proposal for pedway networks in the central area.

By 1966, however, none of the facilities proposed in the civic centre plans or the study of Hill, Bakker, and Akers had been realized, other than Churchill Square. Nor were there any authorized plans which attempted a comprehensive approach to the development of an integrated pedestrian circulation system over the whole central area.

5.2 Pedestrian Facility Planning and Development, 1966-1971

5.2.1 Draft General Plan

In 1966, the City Planning Department submitted to Council the draft version of the first-ever Edmonton General Plan. In this document, the central area was described as the "City's greatest concentration of pedestrian and vehicular traffic, the focus of the transportation network"(Edmonton, 1967, p96), and hence subject to special attention. The plan therefore laid down the following principles:

> "A network of special pedestrian facilities should be provided to ensure that people can walk freely and pleasantly throughout the central area. The following features should be considered:
>
> (1) weather-protected pedestrian walkways to integrate the core retail area
> (2) pedestrian malls and wider downtown sidewalks
> (3) pedestrian ways and arcades in the middle of major blocks
> (4) multi-use pedestrian plazas" (Edmonton,1967, p98)

This was the first official recognition of the importance of connected pedestrian facilities in Edmonton's central area.

5.2.2 1968 Downtown Pedestrian Circulation System Plan

Immediately after the publication of the Draft General Plan, the Planning Department presented a preliminary Downtown Pedestrian Circulation System report to City Council for information in the autumn of 1967. This document embodied the general ideas of pedestrian facility development proposed in the Draft General Plan.

The system described in the report took the form of street-level pedestrian malls, elevated pedestrian walkways, and sub-grade pedestrian concourses, all combined to link the major government, business, and retail zones within the city centre. As can be seen on Figure 5-1, a large part of the total proposed circulation system was below street level. These underground pedways were especially intended to link retail facilities, such as Woodward's and Eaton's department stores, McCauley Plaza shopping centre, and the proposed mall beneath Churchill Square. An elevated walkway was proposed to link the C.N. Transit and Transportation Centre with the area of Rice-Howard Way (101A Avenue and 100A Street). Both the skywalks and the below-grade tunnels proposed in this plan were supposed to be weather-protected. In addition, two types of malls were proposed: one was an active shopping mall on 102nd Street, and the other was the 101A Avenue mall (now the Rice-Howard Mall) which was seen essentially as a place for passive relaxation. The 102nd Street mall was one of the most important features of the downtown pedestrian circulation system. It was initially suggested to be located on 101st Street where most downtown department stores and many other smaller retailing outlets were concentrated. However, 101st Street was also one of the major traffic arteries of downtown, particularly for north-south movement. Because it was difficult to reroute traffic using 101st Street to cross the C.N. tracks, 102nd Street was considered to be the best alternative. It also had possibilities of its own. The presence of the Eaton's and Bay department stores at either end of the street was believed to generate a good deal of pedestrian movement, which was considered essential to the success of a mall. As the report remarked, "the implementation of a weather protected pedestrian circulation system...can have the effect of converting the major shopping streets

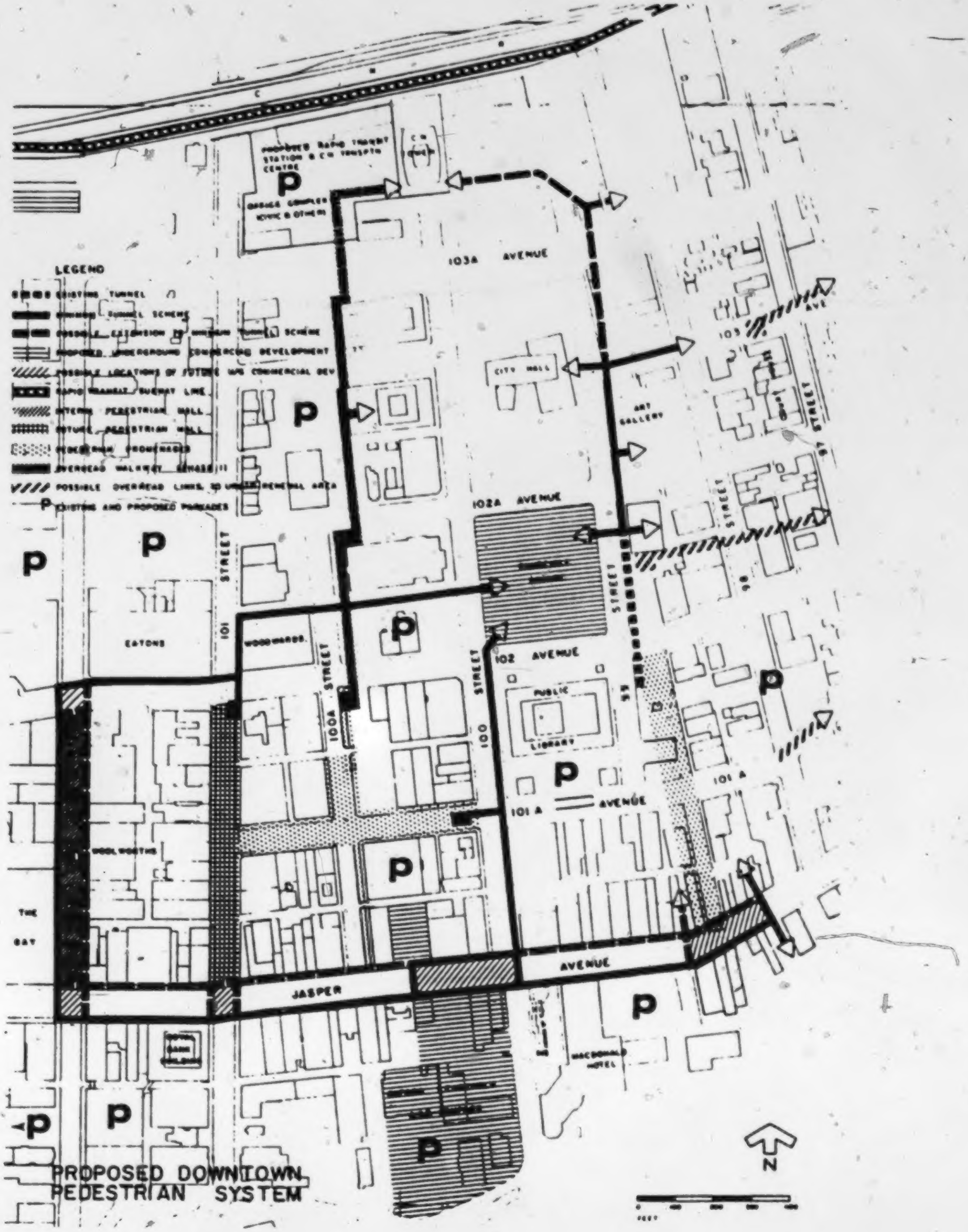

LEGEND
EXISTING TUNNEL
TUNNEL SCHEME
POSSIBLE EXTENSION TO TUNNEL SCHEME
PROPOSED UNDERGROUND COMMERCIAL DEVELOPMENT
POSSIBLE LOCATIONS OF FUTURE U/G COMMERCIAL DEV
RAPID TRANSIT SUBWAY LINE
INTERIM PEDESTRIAN MALL
FUTURE PEDESTRIAN MALL
PEDESTRIAN PROMENADES
OVERHEAD WALKWAY
POSSIBLE OVERHEAD LINKS TO URBAN RENEWAL AREA
EXISTING AND PROPOSED PARKADES
PROPOSED RAPID TRANSIT STATION & CN TRANSPTN CENTRE
OFFICE COMPLEX CIVIC & OTHERS
103A AVENUE
103 AVE
CITY HALL
ART GALLERY
97 STREET
102A AVENUE
98 STREET
99 STREET
101 STREET
EATONS
WOODWARDS
100A STREET
100 STREET
102 AVENUE
PUBLIC LIBRARY
101 A AVENUE
WOOLWORTHS
THE BAY
JASPER AVENUE
MACDONALD HOTEL
P
N
FEET
PROPOSED DOWNTOWN PEDESTRIAN SYSTEM

Figure 5-1 Proposed Downtown Pedestrian Circulation System

Source: Edmonton, 1968

of the downtown area into one vast department store, in which all sections can be reached in comfort and safety" (Edmonton, 1968, p5).

This was the first time that a coordinated pedestrian facility system was officially conceived for Edmonton's central area. The merits of the system were twofold: one was the consideration it gave to major pedestrian generators (particularly retail facilities) and possible future land development; the other was its connection or linkage of different individual facilities in consideration of the severe winter climate. Edmonton is a winter city. The general climate is described in terms of two main seasons, summer and winter, and two transition periods, spring and fall. The winter is the longest of the seasons (5 to 6 months). The mean temperature throughout the winter is about -10°C. Therefore, a weather protected pedestrian circulation system could well encourage optional pedestrian trips in wintertime and help make the central area alive all year round.

On the negative side, there were also limitations to the pedestrian system as proposed in 1968. For instance, although the plan emphasized functional and environmental goals, as well as economic goals to some extent, it said little about social objectives. Thus, the system comprised nothing more than pedestrian passages, in the form of various walkways and malls. No plazas and miniparks were included as elements of this downtown pedestrian circulation system. In addition, the system was limited to the area between 97th and 102nd Streets, covering only a part of the central area, though it was called a downtown pedestrian circulation system. Nonetheless, at a meeting of April 1st, 1968, City Council accepted the concept plan as a guide to the future planning of pedestrian facilities in Edmonton's central area (Edmonton, 1968, p2).

5.2.3 Development of Pedestrian Facilities

In 1967, when the Public Library was constructed, the City of Edmonton built an underground pedway from the library parkade to the office tower known as Chancery Hall (Figure 5-2). This was the first modern pedway ever built in central Edmonton. Then, in 1971, another sub-grade pedestrian link was built beneath Jasper Avenue between the

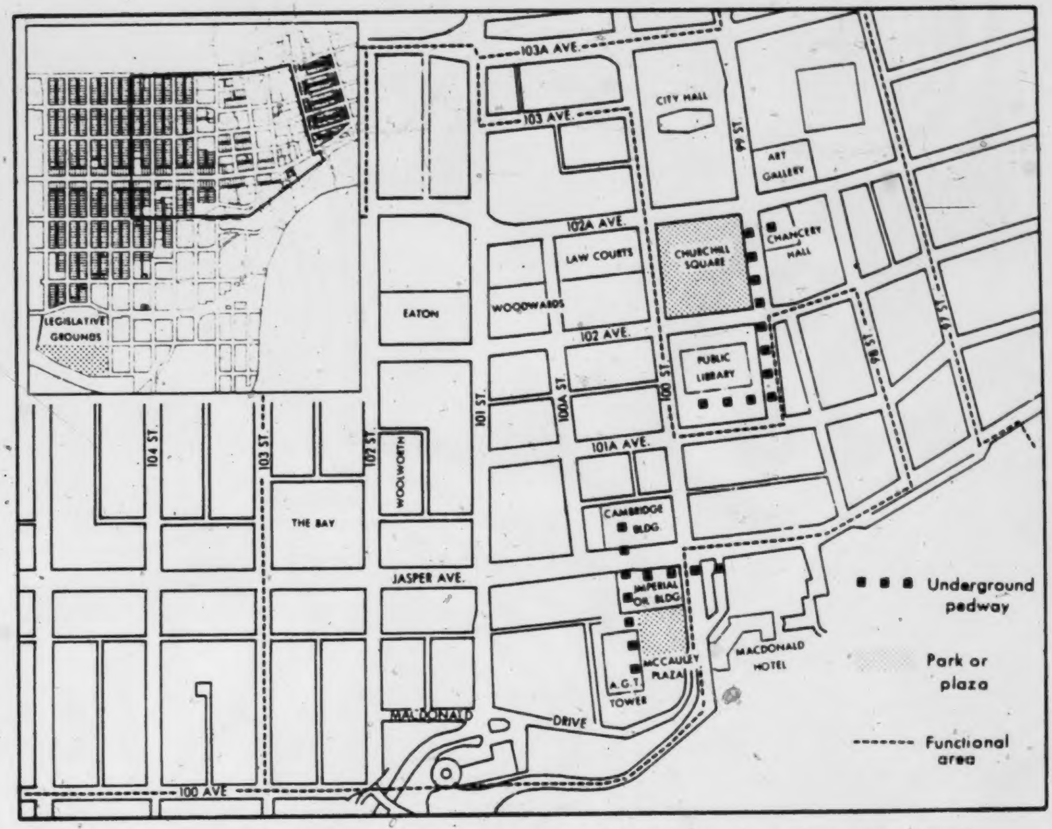


Figure 5-2 Special Pedestrian Facilities in the Central Area of Edmonton, 1971

Cambridge Building and McCauley Plaza, Edmonton's first underground shopping centre. The construction of the underpass not only ensured safe and convenient pedestrian movement across Jasper Avenue, but also stimulated underground development on both sides of the street. More important, it provided access to a major development project which was projected to accommodate about 6,000 employees in two high-rise offices, the A.G.T. Tower and the Imperial Oil Building. The employees in these buildings, as well as those from the Cambridge Building on the north side of Jasper Avenue, could enjoy lunching and shopping without exposing themselves to the inclement weather in wintertime. On the surface, a plaza was built on the east side of the A.G.T. Tower, providing an open space-resting area at this congested downtown junction (Figure 5-2). The plaza was well paved and carefully landscaped with seats, but it has not been heavily used because it lacks other amenities, such as retailing outlets and facilities for children's play. People sitting there see nothing more than through-traffic.

The only other major proposal from this period did not fare as well. The Planning Department prepared a detailed plan for the development of the 102nd Street mall, but this was turned down by Council at its meeting on June 24, 1969. Three aldermen, who represented the interests of the merchants outside 102nd Street, strongly criticized the proposal, expressing fears that the mall would restrict downtown traffic circulation and favour the 102nd Street merchants at the expense of others. They also insisted that Edmonton did not have a climate that would encourage people to stroll around outdoors six months of the year.

Table 5-1 shows both the total existing pedestrian facilities in 1971 and the increases during the preceding five years. It can be seen that, by 1971, central Edmonton had 435m of underground pedways which connected five buildings, and 49,000m^2 of parks and plazas. Spatially, all the pedways were distributed in two functional areas—the civic centre and the CBD-commercial core—where there was a high concentration of pedestrian movement. There were two major parks in the civic centre and the provincial government centre, respectively,

Table 5-1 Spatial Distribution of Pedestrian Facilities in the Central Area of Edmonton 1971

Facility	Boyle Street Area		Civic Centre		Provincial Gov't Centre		McKay Avenue Area		Wholesale Area	
	total	increase	total	increase	total	increase	total	increase	total	increase
improved sidewalk										
skywalk										
sub-grade pedway			285 m	285 m						
pedestrian mall										
plaza										
park			9,000 m^2	0	37,500 m^2	0				
total			285 m 9,000 m^2	285 m 0	37,500 m^2	0				
buildings connected			2	2						

Facility	CBD Commercial Core		CBD West Extension		Total Central Business District		Total Central Area		Buildings connected	
	total	increase	total	increase	total	increase	total	increase	total	increase
improved sidewalk										
skywalk										
sub-grade pedway	150 m	150 m			150 m	150 m	435 m	435 m	5	5
pedestrian mall										
plaza	2,500 m^2	2,500 m^2			2,500 m^2	2,500 m^2	2,500 m^2	2,500 m^2		
park							46,500 m^2	0		
total	150 m 2,500 m^2	150 m 2,500 m^2			150 m 2,500 m^2	150 m 2,500 m^2	435 m 49,000 m^2	435 m 2,500 m^2	5	5
buildings connected	3	3			3	3	5	5		

but both existed before 1966. Table 5-1 also indicates that the development of pedestrian facilities during this period was not great, which reflects the fact that 1966-1971 was a period of moderate land use change (see Table 4-1).

5.3 Pedestrian Facility Planning and Development, 1971-1976

This period brought little new, detailed planning for pedestrian facilities. The only significant development took place with the construction of Edmonton Centre.

5.3.1 Approval of the General Plan

In 1971, City Council passed a by-law adopting the City of Edmonton General Plan which had been issued five years before. The proposals with regard to pedestrian facilities at last gained legal status as official planning policies.

In view of the trend to high-density development in the CBD-commercial core, the General Plan stated the following (Edmonton, 1972, p10.7):

> "(1) The large scale highest density and compactness of development permitted anywhere in Edmonton should be encouraged in this district to ensure maximum opportunities for personal contact...
> —pedestrian facilities such as interior arcades, tunnels and walkways horizontally connecting blocks at different levels should be provided
> —desirable building elements such as plazas, arcades, landscaped areas and entrances should be located for a maximum aesthetic and functional effects
>
> (2) Maximum ease of pedestrian movement should be provided between this area [the CBD-commercial core] and other functional areas, such as the Government Centre and the Civic Centre
>
> (3) The shopping core and high-density office area should be integrated".

Similar policies were also shaped for other functional areas. For example, the General Plan (Edmonton, 1972, pp10.9-10.10) specified that:

> "convenient and attractive weather-protected [pedway] connections should be provided between major building groups [in the civic centre]...
> good pedestrian connections should be provided in the central housing area and the government and retail employment centres...
> good all weather pedestrian connections should be provided within the [provincial] government centre".

5.3.2 Development of Pedestrian Facilities

The single largest land use development in this period was the construction of the first phase of Edmonton Centre, which was completed in 1974. This project covered two city blocks where old Woodward's department store and Edmonton Court House once stood. It consisted of a shopping centre with more than 100 stores, as well as a new 4-storey Woodward's department store and two highrise office towers. In addition, a 10-level parkade was constructed as part of the project, immediately north of the Centre across 102A Avenue.

With the development of this project, an above-grade pedway network connecting three blocks was built (Figure 5-3). As components of this network, a skywalk at the second-floor level was constructed across 101st Street to link Edmonton Centre with Eaton's department store; and another skyway bridged 102A Avenue to connect Edmonton Centre with its parkade. Besides, a pedestrian tunnel was built under 101st Street to provide an underground connection between Edmonton Centre and Eaton's department store. With the completion of these pedways, Edmonton Centre and the Woodward's and Eaton's department stores merged into one large downtown shopping mall. Shoppers from all parts of the city could then drive directly into the parkade on 102A Avenue and tour this extended mall without going outside. Office

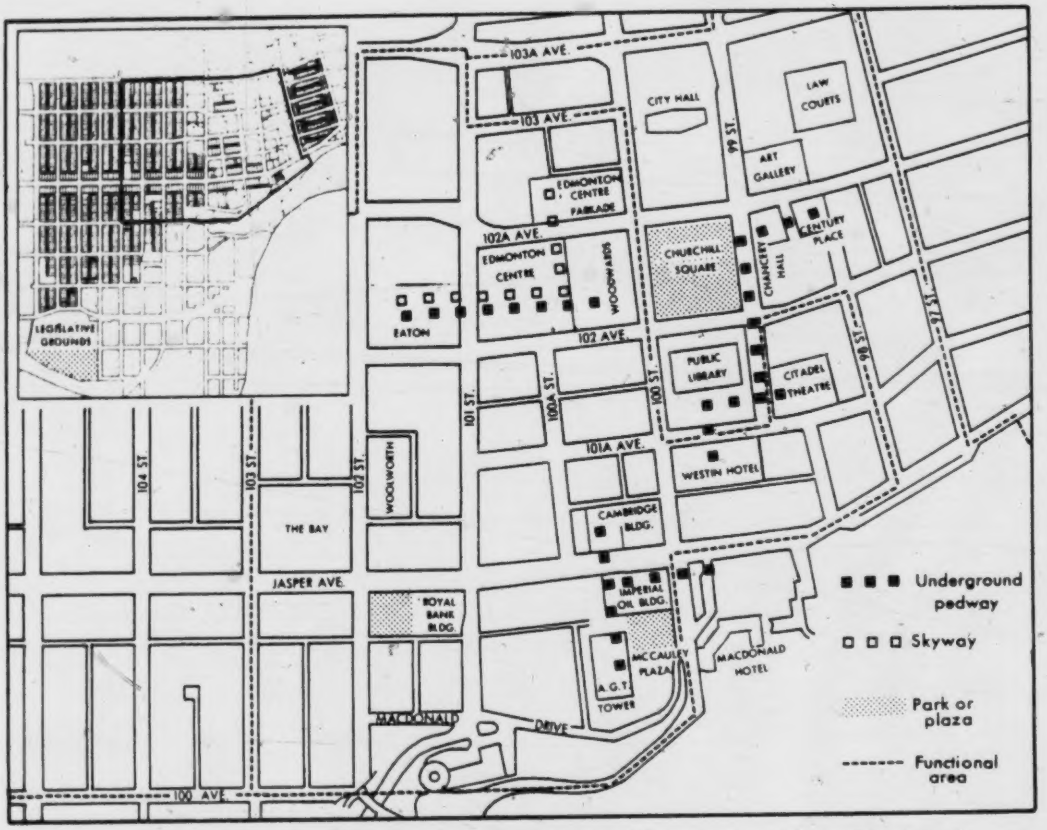


Figure 5-3 Special Pedestrian Facilities in the Central Area of Edmonton, 1976

employees from the towers in Edmonton Centre could also enjoy all the amenities in this area, taking advantage of the pedways to pass their lunch hours on cold or rainy days.

It can also be seen that the development of land uses and pedestrian facilities was generally consistent with the expectations of the General Plan and the Downtown Pedestrian Circulation System concept. The skywalks and the underground tunnel associated with two heavy pedestrian generators—Edmonton Centre and Eaton's department store—greatly facilitated the interior movement of pedestrians, as well as reducing the conflict between vehicular traffic and pedestrians at street level.

Another important development in this period was the expansion of the underground pedway in the civic centre, in connection with construction of the Westin Hotel, Citadel Theatre, and Century Place and their associated garages (Figure 5-3). These pedway extensions did not create a good pedestrian environment, however, because they run through the underground garages. Even today, they are used only by those pedestrians who use the garages.

At the corner of Jasper Avenue and 102nd Street, several buildings were demolished for future redevelopment. Because the form of redevelopment had not been decided at that time, the site was converted into a temporary park by the developer, with financial assistance from the City of Edmonton.

By 1976, the total length of pedways had increased from 435m in 1971 to 975m, and the number of buildings connected by these pedways increased from 5 in 1971 to 11 (Table 5-2). Parks and plazas increased by 2,500m^2, from 49,000m^2 to 51,250m^2, due to the installation of the temporary Abbey Glen park beside the Royal Bank building on Jasper Avenue (Figure 5-3).

Table 5-2 indicates that the pedways that were built during this period were almost all in the CBD-commercial core. This is not surprising if we relate it to the land use changes in this area, described in Chapter 4. Between 1971 and 1976, floor space for various services (including financial, professional, medical, personal, and hotel) and business offices all increased considerably in this

Table 5-2 Spatial Distribution of Pedestrian Facilities in the Central Area of Edmonton 1976

Facility	Boyle Street Area		Civic Centre		Provincial Gov't Centre		McKay Avenue Area		Wholesale Area	
	total	increase	total	increase	total	increase	total	increase	total	increase
improved sidewalk										
skywalk										
sub-grade pedway			305 m	20 m						
pedestrian mall										
plaza										
park			9,000 m^2	0	37,500 m^2	0				
total			305 m 9,000 m^2	20 m 0	37,500 m^2	0				
buildings connected			3	1						

Facility	CBD Commercial Core		CBD West Extension		Total Central Business District		Total Central Area		Buildings connected	
	total	increase	total	increase	total	increase	total	increase	total	increase
improved sidewalk										
skywalk	275 m	275 m			275 m	275 m	275 m	275 m	3	3
sub-grade pedway	395 m	245 m			395 m	245 m	700 m	265 m	10	5
pedestrian mall										
plaza	2,500 m^2	0			2,500 m^2	0	2,500 m^2	0		
park	2,250 m^2	2,250 m^2			2,250 m^2	2,250 m^2	48,750 m^2	2,250 m^2		
total	670 m 4,750 m^2	520 m 2,250 m^2			670 m 4,750 m^2	520 m 2,250 m^2	975 m 51,250 m^2	540 m 2,250 m^2	13	8
buildings connected	8	5			8	5	11	6		

functional area (see Table 4-7). As a result, the intensity of objective demand for pedestrian facilities was enhanced. The development of pedestrian facilities in this part of the central area was well adapted to this intensified demand.

5.4 Pedestrian Facility Planning and Development, 1976-1981

5.4.1 1977 Downtown Pedway Concept Plan

After 1976, land use change accelerated in central Edmonton, in consequence of a variety of redevelopment projects. In response, and in order to mobilize private contributions to the development of the downtown pedestrian circulation system, the Planning Department argued that "a staging program is essential if the pedway network is to become a reality within a reasonable time period. Route priorities should be set forth and an implementation program formulated for each route" (Edmonton, 1977b). To try to give form to these principles, the Planning Department prepared a report entitled **Downtown Pedway Concept Plan**, which was submitted to City Council on July 13, 1977. At that time the following motion was concurred in (Edmonton, 1977b):

> "That the policy guidelines contained in the Pedway Concept Plan be adopted for future planning, design, security, maintenance, financing, operation, and implementation of a pedway network for downtown Edmonton".

The purposes of this new plan were similar to those put forward in the 1968 report on the downtown pedestrian circulation system. What chiefly distinguished the 1977 plan from its predecessor was the greater attention that was given to implementation measures. This meant two things: a more active role for civic departments in the development of pedestrian facilities, and the introduction of measures to secure private participation. For instance, the Pedway Concept Plan laid down the following principles (Edmonton, 1977b, pI-IV)

> "That the Planning Department assume the responsibility of preparing a detailed design brief for individual connections taking into consideration

> both projected pedestrian volumes and level of service to be provided...
>
> That the Planning Department give consideration to a bonus system whereby pedways and other related amenities be provided by private developments in return for development bonuses...
>
> That the responsibility of the approving authority shall be assumed by the Planning Department and Engineering Department. Applications for a pedway development will be reviewed by these departments, approval procedures will be the same as for other development...
>
> That the Planning Department and the Engineering Department have primary responsibility in preparing a pedway bylaw or similar implementation document...
>
> That a guideline be adopted to the effect that the City will not be responsible for more than 20 per cent of the capital cost of grade-separated pedway construction on public land and none of the capital costs on private land" (Edmonton, 1977b).

The Downtown Pedway Concept Plan for the first time presented a pedway hierarchy consisting of spinal pedways, secondary pedways, access pedways, and vertical alignment. (N.B. the term "pedway" was used in this document in the general meaning of walkway). The first three kinds of walkways referred to at-grade facilities, mostly improved sidewalks. The spinal walkways were the major downtown streets where most retail and service activities, or historically interesting points, were concentrated, such as the 102nd Street Mall, Howard Pedway, Jasper Avenue Mall, and Heritage Trail (Figure 5-4). Secondary walkways would serve to supplement the spinal walkway network; they included Rice Street and the extension of the Heritage Trail east from

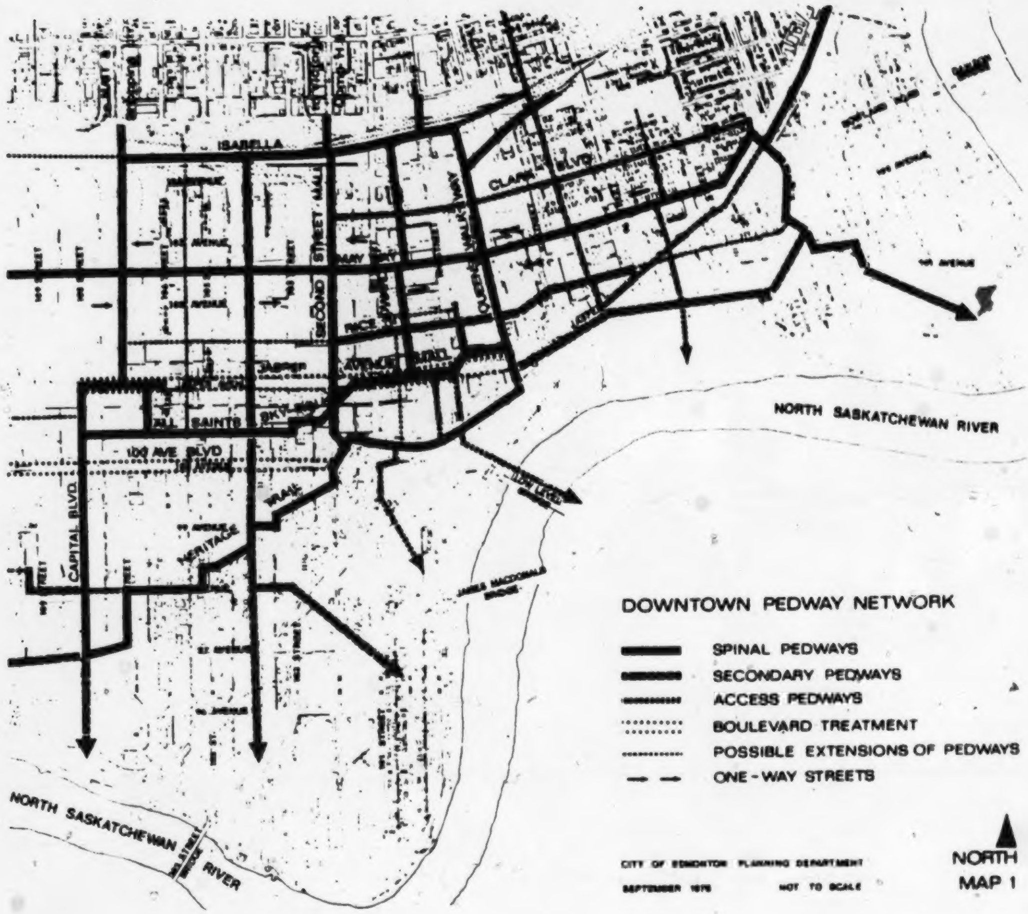


Figure 5-4 Proposed Downtown Pedway Network

Source: Edmonton, 1976

Queen's Walkway. Access walkways would link areas of minor activities and serve as connections between high order walkways (Edmonton, 1977b). Vertical alignment referred to grade-separated pedways. They need no more explanation here. It is also interesting to note that the notion of a heritage trail made its first official appearance in this concept plan. The proposed trail was to run west from 97th Street, along the top of the river valley to the Legislature Grounds. It was intended to serve as a link between the civic centre, the commercial core, the McKay Avenue area, and the provincial government centre, and to give access to viewpoints on the valley edge.

As its title indicates, the concept plan referred to pedways (walkways) only and said little about other forms of pedestrian facilities, such as plazas and miniparks. Part of the reason was the division of responsibilities between different civic departments. For example, the concept plan specified that "The Planning Department [will] assume the responsibility of preparing a detailed design brief for individual connections [of pedways] ... The Parks and Recreation Department will assume primary responsibilities for preparation of working drawings and construction of landscaping of public open spaces related to the pedways" (Edmonton, 1977b, p29). Besides, the Planning Department at this stage did not fully appreciate the importance of a consistent downtown walkway system in terms of paving material, colour, and style. As the plan stated (Edmonton, 1977b, p23):

> "The materials used for interior and exterior finishes of pedways should present a uniform design identity reflecting the function and character of the routes...This does not mean that the same material in the same colour should be repeated throughout the system, but rather that each part of the system should be identifiable as a portion of a large network."

5.4.2 Development of Pedestrian Facilities

5.4.2.1 Development of Pedways

During the period 1976-1981, the most substantial development of pedestrian facilities was associated with the construction of Edmonton's downtown LRT stations. The construction of the first leg of the LRT system was approved by Council in 1973. Excavation started in March 1974, and revenue service commenced on April 24, 1978. In the central area, the line was located within a 1.5km tunnel with two underground stations: the Central and the Churchill. Both stations were built in close proximity to major office buildings and retail stores, which were also major pedestrian generators. The stations were public projects. The City built them with broad below-grade pedways and on-street entrances for pedestrian use. At the same time, the stations offered connecting points at the underground mezzanine level by which adjacent buildings could be linked to the LRT stations and the underground pedways (Figure 5-5). The Central Station was constructed below Jasper Avenue at 101st Street to serve the CBD-commercial core. The pedway stretched from the Royal Bank Building on 101st Street to the Cambridge Building, with five entrances. It also connected with the existing tunnel to McCauley Plaza, making the pedway network in this area more extensive. The Churchill Station lies below 99th Street between City Hall and the Public Library. A pedway was built into the basement level of City Hall, and connections were added to the existing pedway linking the Library and Chancery Hall.

The skywalk network around Edmonton Centre was extended further north with the development of the Four Seasons Hotel and the Oxford Tower, both of which were completed in 1978. This extension provided hotel guests and office employees with access to the shopping amenities in Edmonton Centre and Eaton's department store.

5.4.2.2 Development of Parks

Most of the downtown mini-parks in downtown Edmonton were developed during 1976-1981.

In 1978, Beaver Hills Park (formerly called Amiskwaskahegan Park)

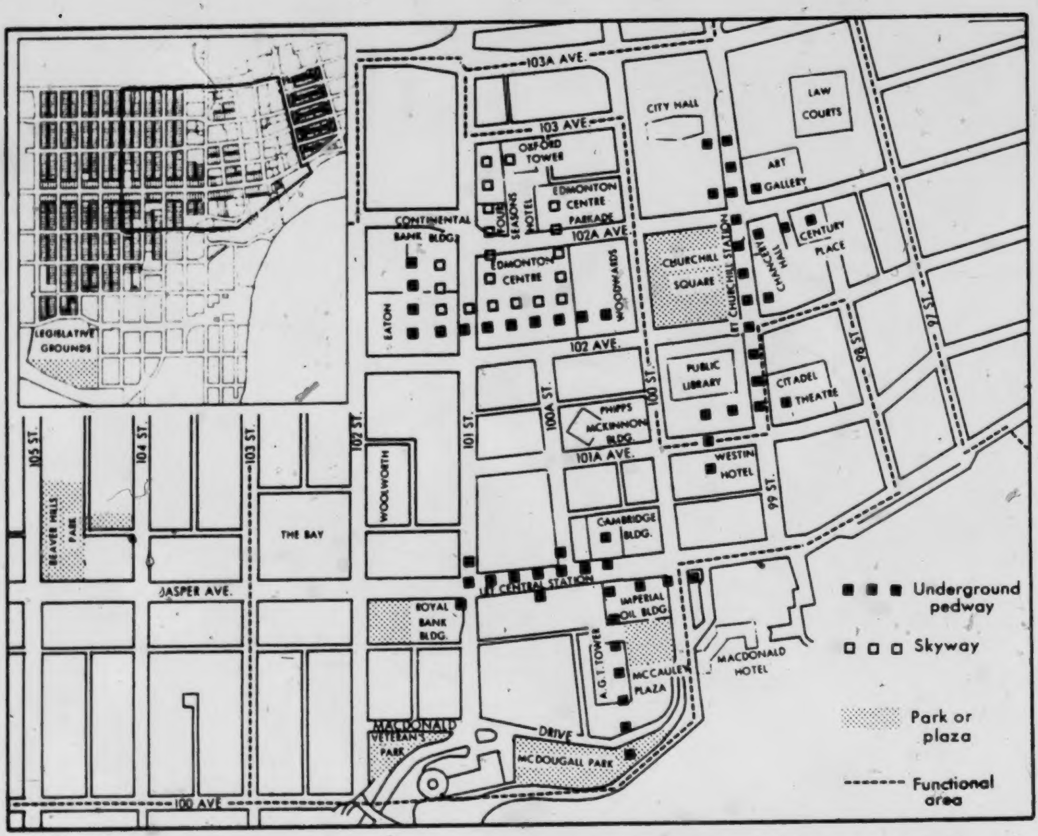


Figure 5-5 Special Pedestrian Facilities in the Central Area of Edmonton, 1981

was developed on a site fronting Jasper Avenue between 104th and 105th Streets (Figure 5-5). Andrew John Agrios owned the property for many years, and it was by virtue of an offer from the Devonian Foundation to construct a downtown park that he made it available. The main design theme of the park was the extensive water feature, consisting of upper and lower falls, three interconnected ponds, benches, and walkways. This park provided a breakpoint in the middle of the long stretch of Jasper Avenue for pedestrians to rest and relax. It also offered hotel guests from Northwoods Inn a pleasant environment for after-dinner strolling. Yet the experience with this park proved to be "a source of local concern and dissatisfaction" (Earl Berger Limited, 1979). It was costly to design and develop, and has had a high rate of vandalism.

In 1981, a second park, McDougall Hill Park, was developed. It actually dated back to 1967, when the Parks and Recreation Department prepared a preliminary site plan for a viewpoint park on McDougall Hill. This project was delayed because of the impending construction of McCauley Plaza and the possibility of widening McDougall Hill Road and Macdonald Drive, and it was not until 1977 that it was reconsidered. The site was bounded on the north by Macdonald Drive, on the south by McDougall Hill Road, and on the west by the Chateau Lacombe parking garage (Figure 5-5). It was a triangular shaped parcel of land of about 7,200m^2, and was one of the few public open spaces adjacent to the CBD from which it was possible to enjoy a sweeping view of the North Saskatchewan River valley. Taking into consideration that about 6,000 workers, 3,000 shoppers, and 18,000 business visitors would be generated by the McCauley Plaza complex (Edmonton, 1977a), the Parks and Recreation Department and the Planning Department regarded the development of a park on this piece of public land as significant, especially for informal use by office workers during noon hours. Discussion lasted for four years, but finally, on November 24, 1981, McDougall Park was opened to the public. A further pedestrian underpass was added to the McCauley underground pedway, which passed beneath Macdonald Drive to give pedestrian access to the hillside east of the Chateau Lacombe Hotel. Pedestrians in the park are able to experience the exciting contrast of giant, high-density buildings and the wide-open landscape of the river valley.

Also in 1981, a third park, named Veterans Park, was established on the old site of the Cenotaph, south of the Edmonton Journal building between 101st and 102nd Streets (Figure 5-5). A portion of Macdonald Drive southeast of the Cenotaph was closed to traffic to make room for the park.

5.4.2.3 Summary

Table 5-3 presents the total pedestrian facilities in 1981 and the increases during the preceding five years. In the period 1976-1981, the total length of pedways in central Edmonton increased by 660m, from 975m in 1976 to 1,635m in 1981. The total area of parks and plazas increased by 9250m^2, from 51,250m^2 in 1976 to 60,500m^2 in 1981. At the same time, the number of buildings that were connected to pedways increased from 11 in 1976 to 17 in 1981. In terms of functional areas, about 70 per cent of the total increase in pedway length occurred in the CBD-commercial core, where the total floor space increased by 203,800m^2. Some 95 per cent of this increase was represented by retail trade, financial services, business offices, and other services (professional, personal, and hotel), which need face-to-face contacts and have high pedestrian generation effects (see Table 4-7). The other 30 per cent of the increase in total pedway length occurred in the civic centre, and was associated with the construction of the Churchill LRT Station. The three newly-developed miniparks were all within the CBD boundaries. It should be emphasized that none of these parks was consciously planned to be incorporated into the downtown pedestrian circulation system, because the development of parks was the responsibility of the Parks and Recreation Department, while planning for pedways was the task of the Planning Department. Besides, there was no evidence that parks were formally recognized as elements of a pedestrian circulation system. It should also be pointed out that nothing was done during this period to improve sidewalks, although this had been proposed in the downtown pedway concept plan. In addition, some important walkways, such as the

Table 5-3 Spatial Distribution of Pedestrian Facilities in the Central Area of Edmonton 1981

Facility	Boyle Street Area		Civic Centre		Provincial Gov't Centre		McKay Avenue Area		Wholesale Area	
	total	increase	total	increase	total	increase	total	increase	total	increase
improved sidewalk										
skywalk										
sub-grade pedway			505 m	200 m						
pedestrian mall										
plaza										
park			9,000 m^2	0	37,500 m^2	0				
total			505 m 9,000 m^2	200 m 0	37,500 m^2	0				
buildings connected			4	1						

Facility	CBD Commercial Core		CBD West Extension		Total Central Business District		Total Central Area		Buildings connected	
	total	increase	total	increase	total	increase	total	increase	total	increase
improved sidewalk										
skywalk	525 m	250 m			525 m	250 m	525 m	250 m	6	3
sub-grade pedway	605 m	210 m			605 m	210 m	1,110 m	410 m	11	3
pedestrian mall										
plaza	2,500 m^2	0			2,500 m^2	0	2,500 m^2	0		
park	6,250 m^2	4,000 m^2	5,250 m^2	5,250 m^2	11,500 m^2	9,025 m^2	58,000 m^2	9,250 m^2		
total	1,130 m 8,750 m^2	460 m 4,000 m^2	5,250 m^2	5,250 m^2	1,130 m 14,000 m^2	460 m 9,250 m^2	1,635 m 60,500 m^2	660 m 9,250 m^2	17	6
buildings connected	13	5			13	5	17	6		

Heritage Trail, Howard Pedway, and the Jasper Avenue Mall, were still at the planning stage. Finally, although the 1977 plan proposed that the Planning Department consider a bonus system for construction of pedways and other pedestrian-oriented amenities by private developers, such a program was never practised.

5.5 Pedestrian Facility Planning and Development, 1981-1987

After 1981, when the Downtown Area Redevelopment Plan Bylaw was adopted, pedestrian facility developments in Edmonton's central area entered a boom period.

5.5.1 Pedestrian Facility Planning Policy under the Downtown Area Redevelopment Plan Bylaw

In keeping with Section 57 of the Alberta Planning Act,1977, which required that all municipal councils adopt a general municipal plan, the Planning Department prepared the Edmonton General Municipal Plan, which was subsequently adopted by Council in July 1980. At the same time, the 1971 General Plan was rescinded. It is also notable that there was no chapter on the central area in the 1980 plan. Instead, a district planning program was established, in accordance with which City Council designated the downtown as a redevelopment area, and adopted the Downtown Area Redevelopment Plan Bylaw in 1981.

With regard to pedestrian facility planning, the Downtown Area Redevelopment Plan Bylaw provided clearer statements of both objectives and actions (Edmonton, 1981). The following features are noteworthy, since they have had considerable impacts on pedestrian facility development:

(1) The Bylaw proposed that at-grade pedestrian connections should be given first priority by both public and private sectors. The recommended actions included upgrading sidewalks, providing weather protection in the form of canopies and arcades, and constructing pedestrian malls.

(2) The Bylaw encouraged greater use of the existing below-grade pedways, by aiming to facilitate retail and service activities along them, especially in the concourses of LRT stations.

(3) The Bylaw adopted a new Downtown Pedestrian Circulation System (Figure 5-6) to replace the 1977 Downtown Pedway Concept Plan. By the late 1970s, the city's planners had realized, that unlike streets, pedways could not be laid out and constructed to await development to occur around them. That was one of the several reasons why Edmonton's downtown pedways did not constitute a system. Since the existing above-grade pedways around Edmonton Centre linked private developments, they had been designed to be open only during regular business hours. As a result, they could not be used by pedestrians during evenings and weekends, as could outdoor sidewalks and plazas. To further complicate this situation, Edmonton had begun its pedway system as a three-level system, but multi-level connections were not common because they are inconvenient to many pedestrians. Therefore, it was argued that "the City must use the present linkages as a beginning for a true pedestrian circulation system, where the pedestrian need not change levels constantly, where doors are not closed at 5:30, where linkages are not dead ended, where there is a choice between outdoor and indoor travel, and where both choices offer an attractive, protected environment enhanced by retail shops and landscaping" (Edmonton, 1980a, p3). It was with these needs in mind that the Planning Department prepared its new plan for the Downtown Pedestrian Circulation System, the plan that was incorporated in, and approved with, the Downtown Area Redevelopment Plan Bylaw.

The 1981 plan did not differ drastically from the 1977 downtown pedway concept plan, but it nonetheless improved on it in several respects and provided a more detailed scheme of pedway alignments. From Figure 5-6, it can be seen that the new plan takes into account the eventual use of every street and avenue to form a true downtown system.

Another feature of the 1981 plan was that it incorporated the Pedestrian Access Support System (PASS), with slight modifications. PASS was an effort to facilitate pedestrian movement by providing a systematic network of access pedways ranging out from every LRT station up to a minimum distance of 150m, or one city block. This scheme does not require any connection fees or levies. The pedways can

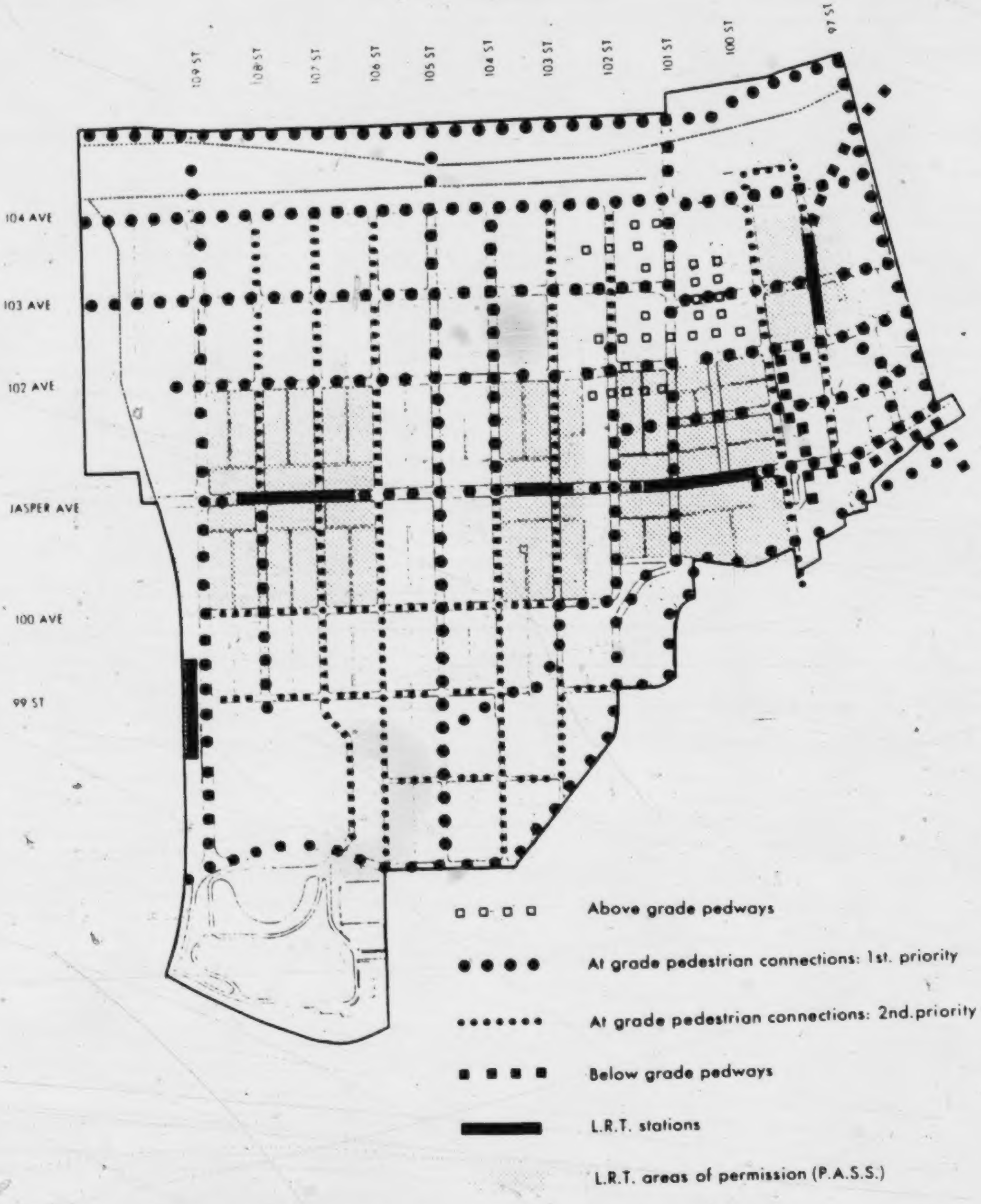


Figure 5-6 Proposed Public Pedestrian Circulation System

Source: Edmonton, 1981b, p59

pass through privately-owned developments and yet be integrated with them. Traffic flow is encouraged in the retail areas of these developments, but elsewhere can be dictated by the physical constraints of each building. The pedways could be either below or above grade. This policy was designed to encourage private participation in extending pedways from underground LRT stations (Edmonton, 1981a).

Finally, in an important change of emphasis, the 1981 plan aimed to encourage the development of at-grade pedestrian connections. Although the advantages of skywalks and underground pedways are obvious (for example, they help avoid surface conflicts between vehicular traffic and pedestrians, they provide weather protection, and they create another level for commercial and service activities), the disadvantages are also considerable. For instance, their construction costs are usually high, and they involve frequent changes of grade level. They can also cause pedestrians to experience orientation problems, or to feel unsafe, especially underground. As a result, pedestrians often prefer to use sidewalks, where they feel more comfortable, psychologically, because they are not confined and are not alone. Since the approval of the 1981 plan, the emphasis in pedestrian facility development has been shifted from grade-separated pedways to at-grade facilities, such as improved sidewalks, pedestrian malls, and plazas.

5.5.2 PRIDE and the Mayor's Task Force Report

PRIDE is the abbreviation of the Program to Improve Downtown Edmonton. It was initially created by the Planning Department with the help of the Downtown Business Association of Edmonton (DBA), and was first approved by Council in 1983.

PRIDE is actually a budget program for implementing the Downtown Area Redevelopment Plan Bylaw. One of its initial objectives was to focus on the upgrading of the environment of downtown streets and public spaces. Of the seven components in PRIDE, the first, which is "physical improvements to public and private spaces", includes several projects that are pedestrian oriented, such as Rice-Howard Way, improvements to Jasper Avenue, Heritage Trail, Churchill Square redevelopment, and the Library Plaza. Most of these projects are elements of the 1981 plan for the downtown pedestrian circulation system. To the extent that they had been implemented by 1987, they will be described in the following sections.

At the same time that PRIDE was organized, in 1983, the Mayor appointed a blue-ribbon commission, to be known as The Mayor's Task Force on the Heart of the City, to recommend means of improving the central area. In 1984, the Task Force published its final report, **A Blueprint For the 21st Century**. In this report, the Task Force expressed strong support for PRIDE and made many detailed recommendations on implementing the pedestrian facility plans budgeted under PRIDE. One of the recommendations that was later absorbed into PRIDE was the Churchill Square redevelopment. This included the construction of a pedway connection from Edmonton Centre to the Churchill LRT Station. The Task Force also recommended that City Council create a Downtown Development Corporation (DDC), a company consisting of both public and private shareholders. In February 1985, the Task Force report was approved in principle by the Council and some recommendations were incorporated back in PRIDE. In May 1986, the Edmonton Downtown Development Corporation was formed and became one of the PRIDE partners. The principal objective of this non-profit corporation is to promote, coordinate, and facilitate "people oriented" projects to revitalize downtown and enrich its economic, social, and cultural environment (Edmonton, 1986-87).

5.5.3 Development of Pedestrian Facilities

5.5.3.1 Legislature Plaza and Pedway

Unlike the other components that will be described later, the planning of the pedestrian facilities in Legislature Grounds has been independent of the downtown pedestrian circulation system. The first proposal for the improvement of the land in front of the Legislature Building was posed in 1975. Because the $270-million project was too expensive, the plan was not implemented immediately. In 1977, a scaled-down alternative plan was unveiled by the Alberta Government with a budget of $10-25 million. This plan included 1,000 underground parking stalls; a pedestrian mall; reflecting pools; a public cafeteria; a cultural centre; and an amphitheatre.

In 1979, the project was again revised with a reduction of the cost to $14 million dollars. This plan included:

—two underground garages with 800-car capacity, east of the Legislature Building

—underground pedways connecting all government buildings in the area

—an east-west pedway extending under 109th Street to eventually join a proposed LRT terminal, while the eastern section would have access to a bus stop on 107th Street

—a pedestrian overpass over 97th Avenue to the Legislature Building

—reflective water pools and water displays, as well as extensive landscaping

Construction started in May 1979, based on this plan. Three years later in December 1982, the project was completed at an actual cost of $60 million (Figure 5-7). This beautifully landscaped plaza merged with the park south of the Legislature Building to form the largest open space in central Edmonton. The employees in three government buildings—the Legislature Building, the Alberta Agriculture Building, and the Sir Frederick Haultain Building—no longer have to walk through the frozen grounds in wintertime. They can drive directly into the underground garages from either 97th Avenue or 107th Street, and then walk to their offices through the underground pedways. In the tunnel of the pedway, a new display area was opened up under 98th Avenue. When the extension of LRT to the University is realized, and a new LRT station at 109th Street is completed, the pedway is expected be used more heavily.

5.5.3.2 Rice-Howard Way

In the 1890s, the names of Rice and Howard were given to two intersecting thoroughfares in central Edmonton. When the cities of

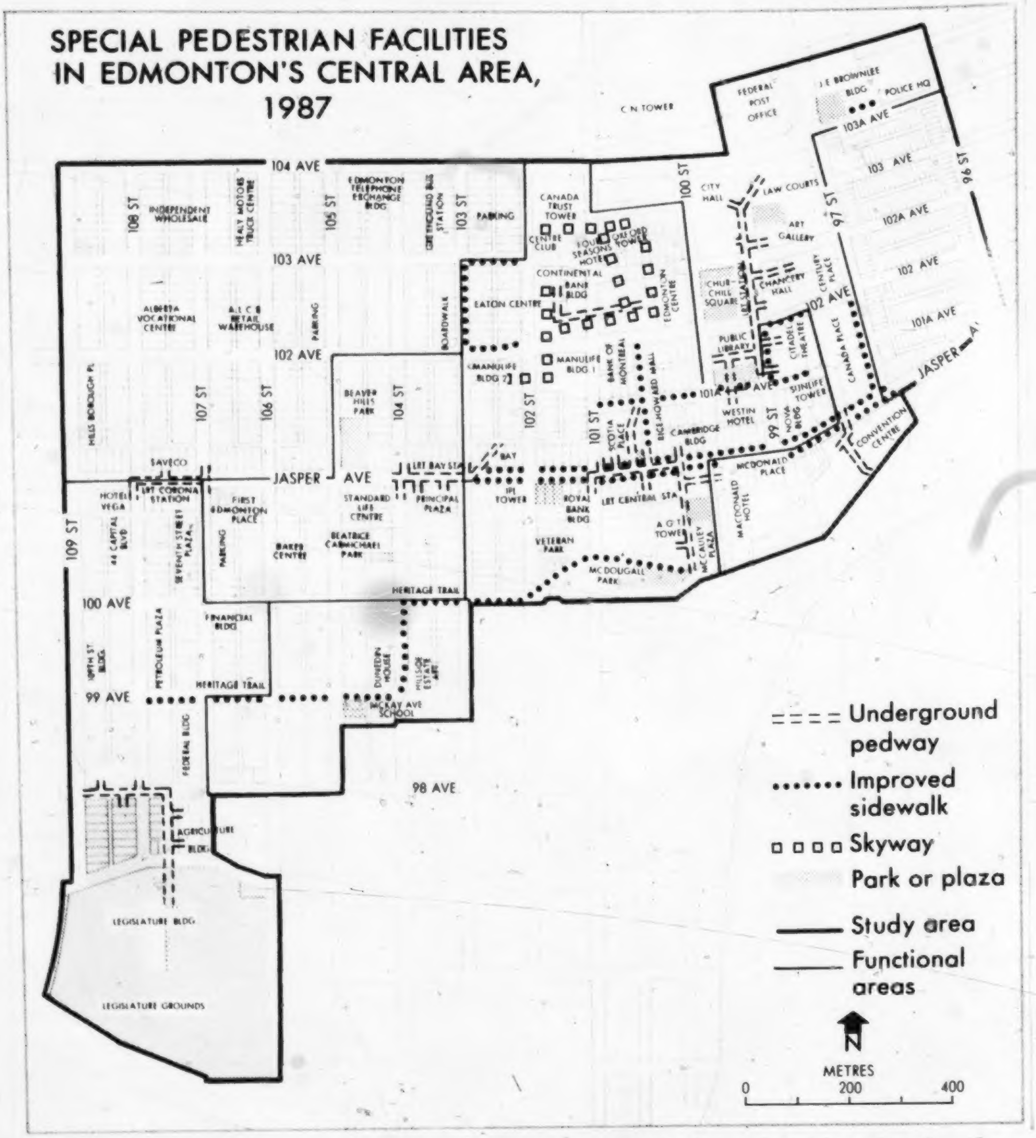


Figure 5-7 Special Pedestrian Facilities in the Central Area of Edmonton, 1987

Edmonton and Strathcona amalgamated in 1912 and agreed on a numerical street system, Rice Avenue became 101A Avenue and Howard Street became 100A Street.

The notion of converting Rice-Howard Way into an area of pedestrian activity originated some twenty years ago. In the 1968 plan for a downtown pedestrian circulation system, the Rice-Howard area was designated as a passive pedestrian mall. In 1974, a proposal for developing this mall was put forth in detail, but the proposal was not implemented at that time. Then, in 1977, Council adopted the downtown pedway concept plan, which again specified a pedestrian mall in this area, combining a spinal walkway with a secondary walkway. The 1974 proposal was subsequently revised and presented to the Municipal Planning Commission in 1978. The revised proposal was later included in the 1981 plan for a downtown pedestrian circulation system and in PRIDE, and was approved with the two documents.

There were two reasons favouring the development of the Rice-Howard area as a pedestrian mall. First, it was bounded by major pedestrian generators on each of its four sides: Edmonton Centre to the north; the Citadel Theatre, Convention Centre, and the proposed Canada Place to the east; Jasper Avenue and the Central LRT station to the south; and several major commercial redevelopment projects to the west (such as Manulife Place). Within the boundaries of this area, several sites had already been redeveloped: the A.G.T. Toll Building Annex, the Phipps-McKinnon Building, and the Canada Trust Building. Other redevelopments had also been proposed, such as Scotia Place and the Bank of Montreal.

Second, the Rice-Howard area provided a setting that could readily be adapted to a pedestrian-scale environment, after the development of Edmonton Centre had closed the northern limb of Howard Street. The four adjoining blocks were all smaller than normal in downtown Edmonton, and neither street was important for vehicular traffic.

The construction of Rice-Howard Mall, as the first PRIDE project, began in 1983. By the end of 1985, phases 1 and 2 were completed. In 1986, phase 3 (Library Plaza) was finished (Figure 5-7). Sidewalks were widened and constructed of red paving stones. Traditional curbs and gutters were replaced with a unique drainage system. At the same time, the number of driving lanes was reduced. All parking meters were eliminated and a two-hour free parking zone created. To improve the appearance of the area still more, all overhead wiring was placed underground, new lamp standards were erected, and flowers, shrubs, and trees were planted. As well, benches, drinking fountains, garbage receptacles, poster kiosks, and telephone booths were specially designed. Of equal importance, these public improvements stimulated private investment. For example, new restaurants and entertainment facilities were added, two existing turn-of-the-century buildings were refurbished, and the deteriorating Tilden parkade received a major face-lift. For the improvement to the Library Plaza, new features, including planters, furniture and canopies, were constructed. Two small stages and a large open space were provided for arts and culture programs, such as craft displays, and for ceremonial events.

This mall has also generated some land use change of its own. A comparison of the 1981 and 1986 Henderson's Edmonton City Directories reveals that the establishment of Rice-Howard Mall has been marked by an expansion of restaurant activities rather than retail outlets. For example, in 1981, there were only two restaurants or cafes in this area, while in 1986, there were 15 (eight of them in the underground concourse of Scotia Place).

The establishment of Rice-Howard Mall created a geographic focal point for a downtown pedestrian circulation system and helped to give that system an embryonic form. From north to south, it completed the connection between the skyway network around Edmonton Centre and the underground pedways at the Central LRT Station which extend as far as the Macdonald Hotel and McDougall Hill. It will also link, from east to west, Canada Place and the Convention Centre in the southeastern part of the civic centre, through the Citadel Theatre and Library Plaza, with the proposed 102nd Street Mall to the west.

Nevertheless, there are at least two problems that reduce the effectiveness of this pedestrian mall. First, vehicular traffic has not been banned completely because of the 5-storey Tilden Parkade at the heart of the mall, at the corner of 100A Street and 101A Avenue. It was built before Rice-Howard Mall was conceived, and the only access is from the original street. No alternative development has been proposed for the site, and as long as the garage remains the access lane will have to be kept open. Thus, at this point, Rice-Howard Way has to accommodate automobiles as well as pedestrians, and so is best described as a semi-mall. Second, Rice-Howard Way lacks its own evening activities, such as theatres, cinemas, and commercial clubs. Some restaurants stay open in the evening hours, but they do not generate high levels of pedestrian traffic.

5.5.3.3 Heritage Trail

Heritage Trail is another project of PRIDE. It was originally described in the downtown pedway concept plan, and was later refined and approved by Council as part of the 1981 downtown pedestrian circulation system. The trail, as described in a working paper, is a component in "a wide variety of convenient pedestrian linkages and attractive, usable parks and open spaces comprising a comprehensive pedestrian system to, from, and within downtown to accommodate the increasing number of downtown users" (Edmonton, 1983b).

The Heritage Trail was planned and built over three years, and opened to the public on June 4, 1986. It runs from the Legislature Grounds along 99th and 100th Avenues and Macdonald Drive to the top of McDougall Hill, passing by several historical buildings and points of interest (Figure 5-7). For example, the trail connects the Legislature Grounds, McKay Avenue School ground, Veterans Park, and McDougall Park. All existing sidewalks on the route were replaced with consistent and distinctive red bricks on the surface. The Trail is lined with large-caliper green ash and black ash planted in cast-iron grates, and with high-pressure sodium lights installed on ornate cast iron standards. It shares much of its alignment with existing pedestrian rights-of-way. Coincidentally, it was expected that the Trail would be most pleasant during the prime convention months, and welcome to conventioneers who are typically confined to travel on foot but with free time to expend.

As part of the Heritage Trail Plan, nine interpretive galleries were proposed along its length from the Legislature Grounds to McDougall Hill Park. As the planners wrote, "A sidewalk alone can't tell stories. The real value and interest of the Heritage Trail will be realized through its gallery program" (Edmonton, 1987c). These proposed galleries are:

(1) Capital Boulevard (108th Street) gallery
(2) 99th Avenue gallery
(3) McKay Avenue School and grounds
(4) 104th Street gallery
(5) YWCA gallery
(6) Greenbrier Hotel gallery
(7) Veteran's Park gallery
(8) Chateau Lacombe gallery
(9) McDougall Hill gallery

Each gallery will focus on one or two themes of special significance to the growth of Edmonton. The City hopes that its initiative in the development of the Trail will evoke the interest of business corporations to contribute to the cost of preparing the gallery displays. So far, only one gallery, at the McKay Avenue School grounds, has been opened, and that was also a public effort. The private response, to this point, has not been enthusiastic.

Future development of the Heritage Trail includes a pedestrian bridge over 100th Street east of McDougall Park and the extension of the Trail to the Convention Centre and Chinatown. It will also be extended west into Grandin-Oliver area along 100th Avenue. If the 102nd Street Mall and the southward extension of Rice-Howard Way across Jasper Avenue are realized, the Heritage Trail will be linked to them at street level.

5.5.3.4 Jasper Avenue Improvement

In 1982, the Edmonton Journal sponsored the preparation of design concepts to spawn interest in the revitalization of Jasper Avenue and challenged the Chamber of Commerce to spearhead the project. In response to this challenge, a joint task force of the Chamber of

Commerce and the City of Edmonton was formed in February 1982 to develop an improvement program. The task force decided that such an ambitious endeavour should only be undertaken if there was strong and widespread support from city residents and Jasper Avenue businesses. Consequently, three surveys were conducted in September 1982 to determine whether there was support, what types of improvements were most favoured by residents and businesses, and how they thought the improvement projects should be financed. These surveys revealed strong and widespread community support for a program to revitalize the visual, physical, economic, and social character of Jasper Avenue (Edmonton, 1983a). The improvement program was later included in PRIDE. In 1984, Council approved the plan and budget for the revitalization of the Avenue from 97th Street to 109th Street, and physical construction began. By the end of 1986, phase 1 (from 100A Street to 102nd Street) and phase 2 (from 102nd Street to 103rd Street) were completed (Figure 5-7). Red paving-stone sidewalks, coordinated street furniture and signs, new lighting, transit shelters, poster kiosks, tree planters, and new street medians brought colour and vitality to the area. "Bottlenecks" were constructed at intersections to facilitate pedestrian crossings. With the development of Canada Place, similar improvements were extended eastward, and phase 3 (from 100A Street to 97th Street) has recently been finished.

This program is more of a joint enterprise between public and private agencies than the Heritage Trail. From phase 2, property owners adjacent to Jasper Avenue contributed, through a local improvement levy, an amount equivalent to the cost of constructing a new concrete sidewalk, curb, and gutter on their frontage. The completion of this section of Jasper Avenue added another spinal walkway to the downtown pedestrian circulation system. It was also hoped to bring back to Jasper Avunue the small retail and service businesses that had moved out when the CBD was experiencing its large-scale redevelopment and functional change. The improved Jasper Avenue provides another alternative to pedestrians. But it also becomes a competitor of the pedways beneath it.

5.5.3.5 Other Developments

During the period 1981-1987, several other pedestrian facilities were built in the area of high pedestrian concentration. They will be reviewed briefly in this section.

In April 1982, the 34-storey Canada Trust Tower and a three-storey prestige athletic club were completed immediately west of the Four Seasons Hotel. These two buildings constituted the first stage of a planned development of an entire block called Edmonton Centre West. At the same time, a skywalk was built over 101st Street connecting these buildings with the Four Seasons Hotel and Edmonton Centre (Figure 5-7).

In June 1983, the downtown LRT line extended westward from Central Station to 108th Street. Two more stations were built: one was the Bay Station in the CBD, between 102st Street and 104 Street; the other was the Corona Station between 107th and 108th Streets beneath Jasper Avenue, at the interface of the provincial government centre and the wholesale-warehouse area (Figure 5-7). At the mezzanine level of both stations, two unconnected pedways were also constructed, although they are less extensive than those at the Central and Churchill stations. The Bay Station has six entrances. Three are on sidewalks; the others open into the Bay department store and two office towers, Principal Plaza and the Confederation Building. The employees from these buildings can go to lunch or shop in the Bay through the underground pedway without having to worry about bad weather above. If they are not satisfied with the Bay, they can ride the free downtown LRT to Scotia Place or McCauley Plaza where more services are available.

The pedway at Corona Station is even shorter than that at the Bay Station. It has only four on-street entrances, and no connections to any building. In fact, there are no major pedestrian generators immediately adjacent to the station, except for First Edmonton Place, an office tower that was built after the station. Much of the land nearby, both north and south of Jasper Avenue, awaits redevelopment. For instance, the Saveco department store is obsolete, and the lands west to Donsdale Place and Healy Motors are now being used as temporary surface parking. It is therefore reasonable to infer that there was no objective demand for an extensive underground pedway in this area at the time when Corona Station was built.

In October 1983, soon after the inauguration of the Bay and Corona stations, Edmonton Transit announced the provision of free LRT service every weekday between 9 a.m. and 3 p.m. and Saturday between 9 a.m. and 6 p.m.. This free service is available in the central area between the Corona Station and the Churchill Station and there is a train every 10 minutes. The significance of this service is that it provides a "mobile connection" between the unconnected pedways at the four downtown LRT stations. This "mobile connection" greatly enhances the accessibility of the downtown underground pedways, most of which are connected to LRT stations.

In September 1983, the Edmonton Convention Centre opened to the public. Under the glass-enclosed canopy bisecting the building, an internal stairway paralleled by escalators and an inclined elevator leads visitors from Jasper Avenue down to the foot of Grierson Hill. The Convention Centre also provided connecting points to other underground pedways: one to the west would tie in with Macdonald Hotel and McCauley Plaza; another to the north would link via the new Canada Place with the Citadel Theatre, the Public Library, the Westin Hotel, and Churchill LRT Station.

Also in 1983, the underground pedway in the civic centre zone was extended northeastward from Churchill Station to the Provincial Law Courts (Figure 5-7). The provincial government assumed all the cost of this connection and agreed to provide a right-of-way through the Law Court Building. They also built a security tunnel between the Law Court Building and the Remand Centre, which has the potential for future public use. The Provincial Law Court complex also included an outdoor plaza, with a cafeteria nearby.

Private developments adjacent to LRT stations showed a good response to PASS (Pedestrian Access Support System) during this period. For example, Scotia Place, which was completed in 1983, provided not only underground access to Central Station but also an at-grade interior passage with a vast concourse to link Jasper Avenue and Rice-Howard Way (Figure 5-7). As well, it offered outdoor space with a plaza and seating. First Edmonton Place near the Corona Station also provided an outdoor plaza for pedestrian use. This enhances access to the station and its underground pedways (Figure 5-7).

Another form of pedestrian facility development during this period is sidewalk arcades. The Citadel Theatre phase 2, which was completed in 1984, provided a glass-covered arcade over the sidewalk along 99th Street. The John E. Brownlee Building also provided a sidewalk arcade with an outdoor plaza. The arcade facing 103rd Street is about 10m wide. The plaza not only offers pedestrians resting space, but eases pedestrian movement from the Law Court Building to the Remand Centre (Figure 5-7). The most recent sidewalk arcade has been installed along 97th Street, as part of the newly-erected Canada Place project.

Except for Jasper Avenue and the Heritage Trail, the City of Edmonton did not generally initiate programs of sidewalk improvement, but left that to private developers. When building projects were completed, the sidewalks around them were usually repaved. Because of different attitudes, however, and different tastes in paving material, the sidewalks improved by private developers often show inconsistency in style, building material, and even width. To overcome this problem, the Planning Department proposed a set of new standards in a working report, the **Edmonton Downtown Design Improvement Manual**, which was released in 1986. With respect to the improvement of sidewalks in the central area, the manual proposed to encourage the general adoption of the urban design construction standards and details used in Rice-Howard Way, Jasper Avenue, and Heritage Trail (Edmonton, 1986). This is a fundamental change from the policy in the 1977 downtown pedway concept plan, which permitted different building materials to be used on downtown sidewalks. In fact, most sidewalks improved by private developers were paved with concrete blocks: examples can be seen at Manulife Place in the CBD-commercial core, at John E. Brownlee Building in the civic centre, and at 44 Capital Boulevard in the provincial government centre. Then, after the manual was issued, some developers began to respond by improving their sidewalk design. For instance, the sidewalks around Eaton Centre and Canada Place are all paved with red bricks like those used on Jasper Avenue and Rice-Howard Way.

As has been mentioned in Section 5.5.2, the Mayor's Task Force on the Heart of the City recommended the upgrading of Churchill Square, including the construction of a pedway connecting Edmonton Centre and the Churchill LRT Station. At the beginning of 1987, the planning for this pedway became active and construction was almost about to start. Then it was delayed by public debate. The pedway was at first proposed to connect the Citadel Theatre, Public Library, Edmonton Telephones Building, A.G.T. Toll Building, and Edmonton Centre in the form of skywalks. One obvious reason for preferring skywalks to underground pedways was the belief that they are generally cheaper. As Garry Weese, the general manager of the Department of Real Estate and Supply Service, remarked, "Going below grade is considerably more expensive...The difficulty is the utilities in the streets" (Edmonton Journal, Jan. 22, 1987). Urban designers also suggested that there could be problems with transients and muggers in an underground pedway. Nonetheless, the skywalk proposal was controversial. Alderman Reimer, for example, did not see much logic in developing a skyway system in the vicinity of the underground LRT station. She said at a Council meeting, "We should be going below grade to make it convenient for the LRT passengers, rather than having them go down and up" (Edmonton Journal, Jan. 22, 1987). She also questioned whether the library staff would be especially pleased to have pedway users trooping through their second floor. Therefore, she suggested that it would make more sense in terms of security to go underground, particularly since the connections already exist. The Transportation Department also favoured an underground pedestrian connection from Edmonton Centre to the south end of the Churchill Station for the effective use of the LRT system. The dispute has only recently been resolved, when an underground form was at last approved.

5.5.3.6 Summary

Table 5-4 shows the total existing pedestrian facilities in central Edmonton in 1987 and the increases during the previous 6

Table 5-4 Spatial Distribution of Pedestrian Facilities in the Central Area of Edmonton 1987

Facility	Boyle Street Area		Civic Centre		Provincial Gov't Centre		McKay Avenue Area		Wholesale Area	
	total	increase	total	increase	total	increase	total	increase	total	increase
improved sidewalk			575 m	575 m	110 m	110 m	625 m	625 m		
skywalk										
sub-grade pedway			830 m	325 m	425 m	425 m			75 m	75 m
pedest-rian mall										
plaza			2,500 m^2	2,500 m^2	26,250 m^2	26,250 m^2				
park			9,000 m^2	0	37,500 m^2	0	1,875 m^2	1,875 m^2		
total			1,405 m 11,500 m^2	900 m 2,500 m^2	535 m 63,750 m^2	535 m 26,250 m^2	625 m 1,875 m^2	625 m 1,875 m^2	75 m 0	75 m 0
buildings connected			8	4	3	3				

Facility	CBD Commercial Core		CBD West Extension		Total Central Business District		Total Central Area	
	total	increase	total	increase	total	increase	total	increase
improved sidewalk	2,065 m	2,065 m			2,065 m	2,065 m	3,375 m	3,375 m
skywalk	900 m	375 m			900 m	375 m	900 m	375 m
sub-grade pedway	605 m	0	225 m	225 m	830 m	225 m	2,160 m	1,050 m
pedest-rian mall	450 m	450 m			450 m	450 m	450 m	450 m
plaza	4,687 m^2	2,187 m^2	1,000 m^2	1,000 m^2	5,687 m^2	3,187 m^2	34,437 m^2	31,937 m^2
park	6,250 m^2	0	6,000 m^2	750 m2	12,250 m^2	750 m^2	60,625 m^2	2,625 m^2
total	4,020 m 10,937 m^2	2,890 m 2.187 m^2	225 m 7.000 m^2	225 m 1.750 m^2	4,245 m 17,937 m^2	3,115 m 3,937 m^2	6,885 m 95,062 m^2	5,250 m 34,562 m^2
buildings connected	17	4	3	3	20	7	31	14

Buildings connected	
total	increase
10	4
21	10
31	14

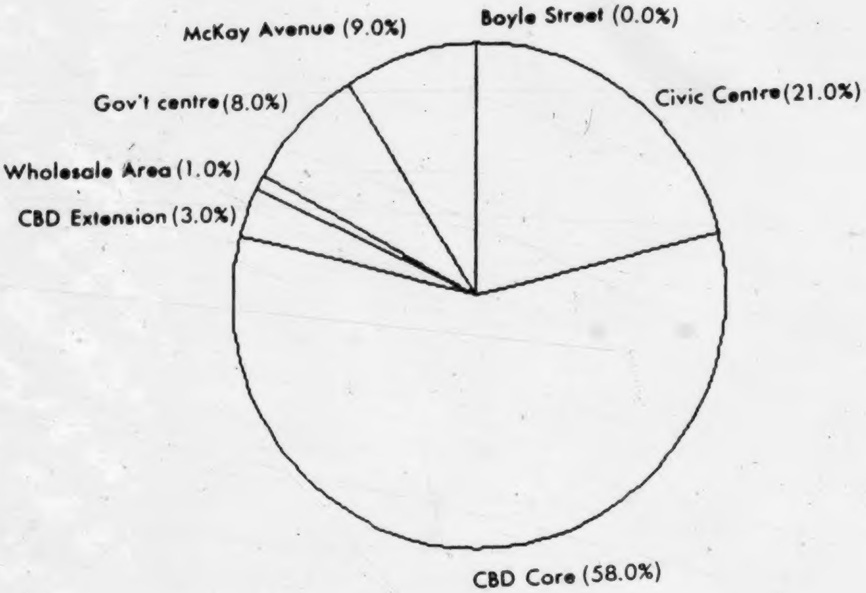
years. Between 1981 and 1987, the total length of the various walkways (including pedestrian malls) increased by 5,250m, from 1,635m in 1981 to 6,885m in 1987. The number of buildings connected with enclosed pedways increased by 14, from 17 to 31. Total areas of parks and plazas increased by 34,562m^2, from 60,500m^2 to 95,062m^2. Although most of these increases continued to be concentrated in the CBD area, and especially in the commercial core, the CBD share of the total walkway length decreased by 10 per cent, from 70 per cent in 1981 to 60 per cent in 1987.

5.6 Summary

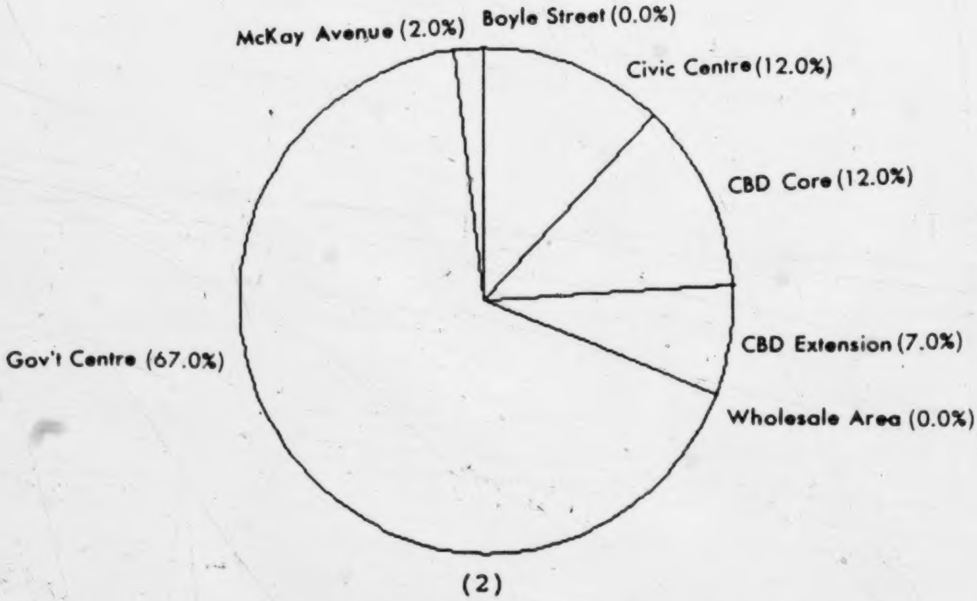
This chapter has offered a detailed examination of pedestrian facility planning and development in the central area of Edmonton between 1966 and 1987.

In summary, the substantial development of special pedestrian facilities in central Edmonton started in 1967 with the construction of the underground pedway connecting the Library parkade and Chancery Hall in the civic centre functional zone. Since then, many different facilities have been built. The process of pedestrian facility development was especially rapid in the 1980s. Furthermore, the array of pedestrian facilities became more diversified. Before 1981, pedestrian facilities mainly took form of enclosed, grade-separated pedways. After 1981, the emphasis shifted to outdoor, at-grade facilities, including improved sidewalks, pedestrian malls, and plazas. The justification for this shift is twofold: first, multi-level changes between facilities are inconvenient to many pedestrians (Edmonton, 1980a); second, indoor climate-controlled facilities are not necessarily pleasant in summertime. After a long, cold winter, Edmontonians would often prefer to use outdoor facilities to enjoy the sun and the visual beauty of the central area.

During the past twenty years, 6,885m of walkways of various kinds and 48,562m^2 of parks and plazas were built in Edmonton's central area, and 31 buildings were connected to pedways. Figure 5-8 clearly summarizes the spatial distribution of pedestrian facilities in the central area of Edmonton in 1987. In terms of spatial distribution,



(1)



(2)

Figure 5-8 (1) Spatial Distribution of Walkways (including Pedestrian Malls) in the Central Area of Edmonton, 1987
(2) Spatial Distribution of Parks and Plazas in the Central Area of Edmonton, 1987

most pedestrian facilities are concentrated in the CBD area (62 per cent of the total lengths of walkways and 19 per cent of total areas of parks and plazas), and especially in the CBD-commercial core. The next most important areas are the civic centre and the provincial government centre. On the other hand, there is a lack of almost any kinds of pedestrian facilities in the Boyle Street area and in the wholesale-warehouse area (except for the Corona pedway under Jasper Avenue at the interface of the wholesale-warehouse area and the provincial government centre). This pattern is highly consistent with the spatial land use organization of the central area of Edmonton that has been described in Chapter 4.

In terms of planning, three plans prepared by the Planning Department under the auspices of City Council have been the most important. These are the 1968 plan for a downtown pedestrian circulation system, the 1977 downtown pedway concept plan, and the 1981 downtown pedestrian circulation system plan. The planning policies with regard to pedestrian facility development in these plans advanced from loose statements of general principles to more detailed proposals with firm implementation actions. The 1968 plan actually included concrete scheme of possible facilities, but it said little about the means of implementing the scheme. As a result, the development process for the pedestrian circulation system was very slow. The most important development of the early 1970s, the Edmonton Centre pedways, was initiated by the developers of the project. Then, in the 1977 plan, it was recognized that the city must take initiatives to provide key sections of the network and, at the same time, encourage private contributions, to achieve a complete system within a reasonable time period. However, there was still no comprehensive implementation program to secure the materialization of individual projects. For instance, none of the spinal walkways proposed in the 1977 plan was implemented by 1981 when the Downtown Area Redevelopment Plan Bylaw was adopted. In addition, because the City at that time did not fully appreciate the value of a consistent downtown walkway system, most sidewalks improved by private developers of adjacent properties were inconsistent in paving material, design style, and even width. To overcome these problems, the 1981 plan was formulated and incorporated in the Downtown Area Redevelopment Plan Bylaw. The implementation of the 1981 plan was secured by a staging budget in PRIDE. At the same time, a non-profit organization—the Downtown Development Corporation—was formed to promote, coordinate, and facilitate public-private development partnerships (e.g. to secure financial support from governments and private sectors for development projects). Since the adoption of the 1981 downtown pedestrian circulation system plan and the formulation of PRIDE, the pedestrian facility development in central Edmonton entered a booming period. Several spinal walkways described in the 1977 plan, such as Rice-Howard Way, improvement to Jasper Avenue, and Heritage Trial, were completed after the 1981 plan began to be implemented.

Chapter 6 Conclusions of the Study and Recommendations for Future Planning

This chapter consists of two parts: the first part offers the conclusions, drawn from the thesis, the second provides some recommendations for future planning.

6.1 Conclusions

As has been stated in Chapter 1, the thesis was designed to focus upon the development of pedestrian facilities in the central area of Edmonton as an outcome of the dynamic relationship between the two forces of objective demand and conscious planning. Its aims were to try to determine, first, how well planning policies have responded to changes in objective demand caused by land use changes, and, second, the relative effects of the two forces on the actual development of special pedestrian facilities. This section is to summarize the most important findings of the research and to offer the major conclusions drawn from the thesis study.

6.1.1 Association of Pedestrian Facility Development with Major Land Use Change Events and Planning Policy Adjustments

In general, the pedestrian facility network in Edmonton's central area has been a planned system. The City of Edmonton Planning Department with the cooperation of other civic departments played an important role in preparing plans and other working reports. The planning and development of pedestrian facilities in central Edmonton has also been closely related to the overall land use structure, and the change of the land use structure, of the central area, by which the spatial pattern of objective demand for pedestrian facilities is determined. Figures 6-1 and 6-2 show the floor space change for the first five functional categories in Table 3-2 and the pedestrian facility development in central Edmonton, in both geographical and chronological terms. These figures clearly demonstrate the association of the development of pedestrian facilities with the change of objective demand. During the period 1966-1971, the increase of floor space for the first five functional categories in Table 3-2, which have the highest pedestrian generation effects, was modest. Although

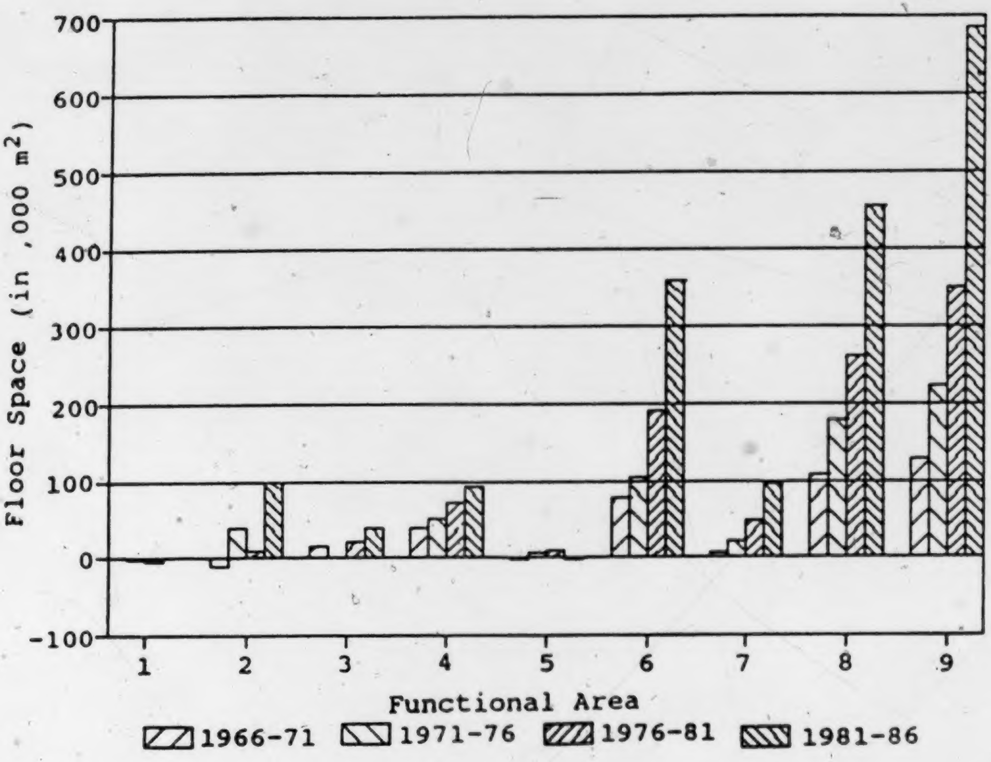


Figure 6-1 Floor Space Changes for the First Five Functional Categories in Table 3-2, 1966-86

Key to Fuctional Areas

1 Boyle Street Area
2 Civic Centre
3 Wholesale-Warehouse Area
4 Provincial Government Centre
5 McKay Avenue Area
6 CBD-Commercial Core
7 CBD-West Extension
8 Whole CBD
9 Whole Central Area

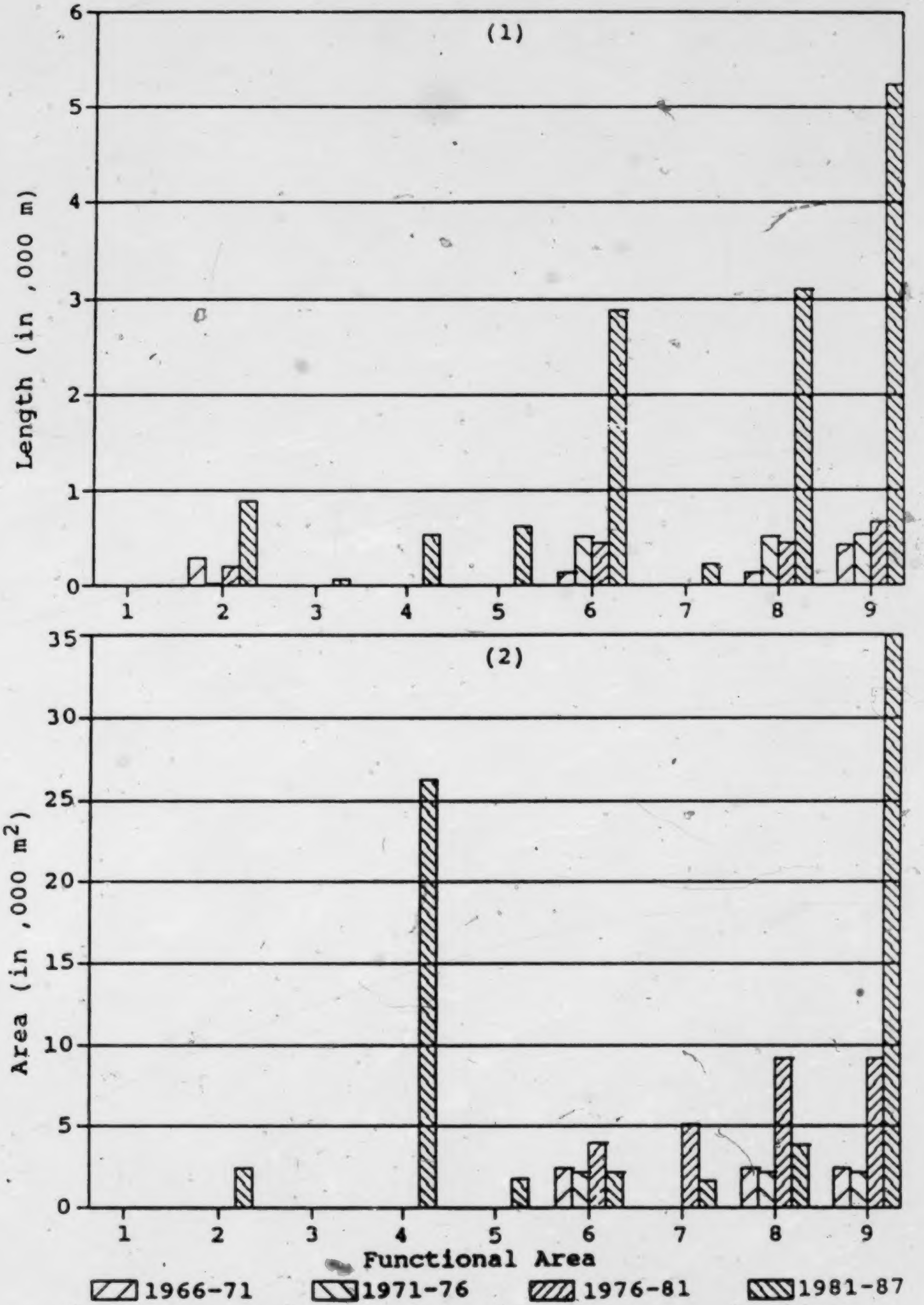


Figure 6-2 Pedestrian Facility Development in the
Central Area of Edmonton, 1966-1987
(1) Walkways (including Pedestrian Malls)
(2) Parks and Plazas
Key to Functional Areas is the Same as Those on
Page 133 for Figure 6-1

the 1968 plan and the 1971 General Plan provided a scheme for a downtown pedestrian circulation system in central Edmonton and general principles for the development of the scheme (i.e. what facilities should be built and where), they did not propose any firm actions to secure the implementation of the plan (i.e. when individual facilities should be completed, who ought to be responsible for the implementation of the plan, and who would assume the construction costs). As a result, the development process for a downtown pedestrian circulation system was very slow, but there was no great pressure from objective demand either. After 1976, and especially after 1981, land use change in the central area of Edmonton accelerated. The floor space for the first five functional categories in Table 3-2 increased significantly (Figure 6-1). This implies that objective demand for pedestrian facilities was greatly intensified. Under the growing pressure from the intensified demand, the City of Edmonton devoted more attention to the actions needed to implement plans. The policy shifts with regard to pedestrian facility development were reflected in the 1977 downtown pedway concept plan and the 1981 downtown pedestrian circulation system plan, especially the 1981 plan. To carry it into effect, the City incorporated the plan in the Downtown Area Redevelopment Plan Bylaw and formulated PRIDE to secure the implementation of individual projects. Consequently, the development of pedestrian facilities was greatly accelerated (Figure 6-2). In the six years 1982-1987, the new developments were roughly three times greater than over the whole of the previous 15 years.

In terms of functional areas, most of the increase in floor space for the first five functional categories in Table 3-2 occurred in the CBD (especially the CBD-commercial core), the civic centre, and the provincial government centre. In response, the CBD and the civic centre has always received the top consideration in the planning process for pedestrian facility development. For example, the 1968 plan for a downtown pedestrian circulation system covered only a limited area of central Edmonton. But this limited area included most parts of the commercial core and the civic centre. Although the 1981 plan extended its scope to the whole central area (or downtown), most special facilities (pedestrian malls, grade-separated pedways, improved sidewalks) were still planned in the CBD and the civic centre. Figures 6-1 and 6-2 visually show the spatial relationship between land use change (more exactly the change of objective demand) and pedestrian facility development in the central area of Edmonton. For instance, with the intensification of redevelopment and the increasing specialization in activities with high pedestrian generation effects in the CBD, more and more facilities were added to this limited area. By contrast, the land use changes in the Boyle Street area and the wholesale-warehouse area were much less significant. These two areas have been given low priorities in the planning and budgeting for pedestrian facility development, and so have the fewest pedestrian facilities of all.

The planning and development of pedestrian facilities in central Edmonton also reponded to the spatial shifts of objective demand. For example, as the CBD moved northeastward, the pedway network around Edmonton Centre extended in the same direction. The eastward expansion of civic and governmental functions in the civic centre also caused spatial shift in objective demand. In response, more pedestrian facilities were planned and built in this area, such as those around Edmonton Convention Centre, Canada Place, the Law Court Building, and the John E. Brownlee Building.

6.1.2 Interaction of the Two Forces: Objective Demand and Conscious Planning

It is true that there has been a close association of pedestrian facility development in central Edmonton with the land use change events and the planning policy adjustments. This does not mean, however, that the association has been a simple linear one, that is, land use changes first cause intensification and spatial shift of objective demand; planning policies are then formulated in response to the changes of objective demand; and, finally, pedestrian facilities are built as the outcome of the planning policies in response to objective demand. The relationship between the two forces has been more complicated than that.

First of all, planning for pedestrian facilities in central Edmonton has not always reflected the changes of objective demand perfectly. Because the plans have not incorporated surveys of specific pedestrian generation rates for various land use types, forecasting or projecting changes in objective demand, which is the most important characteristic of planning, was impossible. As a result, there were often time lags between the change of objective demand and policy formulation. In such circumstances, chances for pedestrian facility development were missed. For example, since 1976, the provincial government centre has experienced the most extensive redevelopment in its history. Large areas of single-family housing and surface parking were replaced by office towers. Consequently, objective demand for pedestrian facilities was greatly intensified. However, this rapidly redeveloped area did not receive the planning priority it deserved. Although the 1977 downtown pedway concept plan proposed the development of a boulevard called Capital Boulevard to run along 108th Street in this area, the concept was vague and no detailed planning was done. It was not until 1984 that the Mayor's Task Force suggested that 108th Street be developed into a pedestrian promenade with dramatic lighting, decorative paving, trees, and statues (Edmonton, 1984b). Because most private redevelopment projects were completed by then, and associated sidewalks were repaved by developers with different paving materials, colours and styles, the development of this boulevard was made costly for the City. It still has not materialized. Except for the Capital Boulevard and the Heritage Trail (part of which runs through the provincial government centre), the City did not plan any special pedestrian facilities in this extensively redeveloped area. The only important facilities (i.e. the Legislature Plaza and the pedway beneath it) that have be built were initiated and developed by the Government of Alberta. They are in fact independent of the city's downtown pedestrian circulation system plan.

Second, the development of pedestrian facilities has been regarded as an initiative that public authorities can take for the revitalization of the central area of Edmonton. The logic of this initiative is that the provision of special pedestrian facilities, and the creation of a more attractive pedestrian environment, is expected to attract more people, and thus more people-oriented businesses, into the central area. This idea is explicitly expressed in the **Downtown Area Redevelopment Plan Bylaw** and **PRIDE**. The development of the Rice-Howard Mall and the improvement of Jasper Avenue both contributed to the intensification of pedestrian activities in the surrounding areas, and enhanced the objective demand for more pedestrian facilities to connect them with other parts of the central area.

6.1.3 The Role of Other Actors

It is also concluded from the thesis study that the development of pedestrian facilities in the central area of Edmonton is not solely the outcome of objective demand and conscious planning. Other actors (or forces) also contributed to this development. These are politicians, private developers, and diverse interest groups, all with their own perceptions of needs and priorities. Normally, all kinds of plans have to be approved by city council before they are implemented. Development agreements also require council approvals, so the politicians usually have the final say in actual development of the pedestrian circulation system in central Edmonton. Lobby groups with different interests often influence politicians to make decisions favourable to them. For example, when Council considered the 102nd Street Mall proposal at its meeting on July 24, 1969, three aldermen, who represented the interests of the merchants outside 102nd Street, strongly criticized the proposal by arguing that the mall would restrict downtown traffic circulation and favour 102nd Street merchants at the expense of other businesses outside the mall. As a result, the construction of the mall was postponed sine die, though the objective demand for a mall in that area was realized and a detailed plan for the development of a mall was formulated.

At the same time, private developers were responsible for initiating the development of many of the pedestrian facilities in central Edmonton, though these initiatives might be spontaneous and uncoordinated. For instance, since the late 1960s when McCauley Plaza was developed, there has been a tendency for private developers to construct building complexes rather than single, free-standing buildings. Edmonton Centre, the Four Seasons Hotel and Oxford Tower, the Manulife complex (phases 1 and 2), and Eaton's Centre are all example. These complexes removed most of the small on-street retailing and service outlets, replacing them with indoor shopping centres, which included interior paths to facilitate pedestrian circulation within them. There has also been a tendency for private developers to bear the cost of building pedways to connect their buildings with the public pedestrian facility system, such as the skyway network around Edmonton Centre and the pedways within the area of PASS. The justification for this tendency is that business owners found they could not afford to isolate themselves from the main pedestrian flows (Gurofsky, 1988). Before the 1981 plan for a downtown pedestrian circulation system and PRIDE were implemented, a considerable proportion of the pedestrian facilities in central Edmonton were initiated by private developers.

6.1.4 Complex Form and Winter City Concept

After twenty years of planning and development, an embryonic form of the downtown pedestrian circulation system has been achieved in the central area of Edmonton. This system has taken a complex form, in which below-, at-, and above-grade facilities are combined. This combination makes Edmonton's system unique in comparison with those in other North American cities, such as Minneapolis, Montreal, Toronto and Calgary. In the commercial core where building density is extremely high, facilities mostly take form of grade-separated pedways, such as the skyway network around Edmonton Centre and the underground pedway network around McCauley Plaza. In the civic centre, major pedways are underground for aesthetic considerations and for connection with the Churchill LRT station. To balance the two grade-separated forms, at-grade facilities have received more attention in recent years, for the greater convenience of pedestrians.

In spite of its three-level form, the pedestrian circulation system in central Edmonton, like those in central Toronto and central Montreal, was designed to be incorporated with its downtown underground LRT lines to form a mixed transport system. Another uniqueness in Edmonton's case is the "mobile connection" performed by the free downtown LRT, which has made the pedestrian system more efficient. In addition, because severe winter weather has been one of the most important factors for the development of pedestrian facilities in central Edmonton, whether those facilities took the form of skywalks or underground tunnels they were all designed not only to reduce surface conflicts between vehicular traffic and pedestrians, but also to protect their users from the weather. When the emphasis was shifted to at-grade facilities, this factor was not neglected. The construction of setback arcades over sidewalks and the development of interior spaces in new building complexes (such as interior routes through buildings integrated with shopping concourses) all reflected the consideration of Edmonton as a winter city.

6.1.5 Conclusion

In general, the pressure from the land use changes and the intensification of objective demand is the most direct force driving the development of pedestrian facilities in the central area of Edmonton. The planning policies with regard to pedestrian facility development were formulated to cope with these pressures, to stimulate the revitalization of the central area, and to coordinate private initiatives. Generally, the planning policies reflected the land use changes in central Edmonton and the resultant changes in objective demand. But there have been time lags between the changes in objective demand and the fomulation of effective planning policies. Furthermore, because no surveys of pedestrian generation rates were conducted for different land use types, it was impossible to forecast spatial change in objective demand. Planners simply depended on their impressions of where demand was concentrated, and their images of a desirable pedestrian environment. This greatly reduced the value of planning for the development of pedestrian facilities. Edmonton's experience indicates, as well, that other actors are involved in the decisions to build pedestrian facilities; and it implies that facility schemes and implementation programs to stage and finance individual projects must be formed at the same time, and public-private cooperation sought from the very beginning, if a complete pedestrian circulation system can be achieved within a reasonable period. PRIDE is an excellent example, since it played an important role in the implementation of the 1981 plan.

6.2 Some Recommendations

In this section, I would like to attempt four recommendations for future planning consideration.

(1) In future planning for pedestrian facilities in Edmonton's central area, the City should pay attention to the concept of the "pedestrian district" which was defined in Chapter 3. It would be proper to name such a district the "central pedestrian district" (CPD). This term first appeared in the book **The Rediscovery of the Pedestrian: 12 European Cities**, where it was used to refer to the whole central area of Amsterdam (Brambilla, 1976, p65). For Edmonton, however, the CPD should be only part of the central area.

To delimit a CPD, central area-wide surveys of pedestrian generation rates for each block should be conducted and the origin-destination pattern be mapped. Based on survey results, certain kinds of indices, similar to those used for delimiting the CBD, should be developed as a basis for boundary delimitation. The justification for having such indices exists in the following consideration: the establishment of a CPD arises from the need to ease pedestrian movement, but it is at the expense of vehicular traffic. If unnecessarily large, it would disrupt the normal movement of automobiles; if too small, it would not achieve the pedestrian objectives. In Edmonton's central area, a CPD would probably cover most of the CBD-commercial core as well as part of the civic centre. Convenient access to this CPD should be provided. The underground LRT line provides an optimum approach to this district, but adequate "peripheral parking" adjacent to the district should be provided as well. Within the CPD, surface traffic should be rerouted, and the numbers of automobiles entering the area be reduced. Meanwhile, some other kinds of inexpensive facilities to assist pedestrians, such as mini-buses and people-movers, should be considered, if the resultant CPD is somewhat large. This idea is consistent with the 1981 downtown pedestrian circulation system plan which emphasizes the use of surface facilities, because the use of sidewalks is enhanced under the CPD approach.

(2) Existing pedestrian facilities can be better improved by introducing more appropriate activities to them. For instance, as was mentioned in Chapter 5, Rice-Howard Mall lacks evening activities to attract pedestrians except for some restaurants. It is therefore suggested that more recreational and entertainment activities (such as theaters, cinemas, commercial clubs, and electronic games) be planned. The Kelly/Ramsay Block which is now mostly vacant has a potential for such activities. This building has been designated as a heritage building with conservation value. Its structure may not be good for conversion into a theatre or cinema, but it can probably be converted into a commercial club. After the establishment of a CPD, the Tilden Parkade in Rice-Howard Mall might be demolished for the development of mall-type activities. Although experience in other North American cities has proved that pedestrian facilities have the effect of attracting retailing and service activities to them, this process is usually slow. The City of Edmonton should work out some kinds of incentives to encourage such activities. Proper incentives, such as tax deductions, would most probably speed this process.

(3) Some new design ideas for the development of pedways should also be considered when new buldings are constructed. For example, the concept of setback arcade could be used at a second-floor level. In consideration of the likelihood of high wind speeds, and Edmonton's severe winter, the second-level arcades should be enclosed and air-conditioned. They will retain the advantages of connecting adjacent buildings, avoiding surface conflicts between pedestrians and vehicles, and providing pedestrians with protection from bad weather. Moreover, since these pedways would not go through the interiors of the connected buildings, they could be open to the public after business hours in the evening and on weekends. This may be a good way to improve the use of private connections in the downtown pedestrian

circulation system. But aesthetic considerations are also important when this concept is employed.

(4) In future planning, it is suggested that the Boyle Street area between 96th and 97th Streets should be included in the downtown pedestrian circulation system. As has been mentioned previously, the civic centre has been encroaching upon this part of Chinatown. Besides, there is a Chinatown Plan which proposes many redevelopment projects, such as a Chinatown garden, a ceremonial square, a gate, and a new market. With the development of these projects, it is expected that there will be more and more exchanges of pedestrians between the civic centre and this part of Chinatown, which are separated by 97th Street, a major downtown traffic artery. Plans for building pedestrian facilities across 97th Street should be conceived by the City. Other facilities within this part of Chinatown should also be planned beforehand if they are expected to be private contributions, so that chances will not be missed when the above proposed projects are started.

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APPENDICES

Appendix 1

A General Activity and Land Use Coding System Related to Systems in Current Use

General Activity System and Two-Digit Land Use Coding System[a]	Equivalent Codes under SIC or HHFA-BPR Systems[b]
1. *Extraction Activities* (including stockpiling and assembly of material incidental to these activities)	HHFA-BPR 8 (Resource production and extraction, including related services and processing)
10 Agriculture	SIC 01, 02 (HHFA-BPR 81 similar)
11 Agricultural services, including hunting and trapping	SIC 07 (HHFA-BPR 82 similar)
12 Forestry	SIC 08 (HHFA-BPR 83 similar)
13 Fisheries	SIC 09 (HHFA-BPR 84 similar)
14 Mining, including on-site ore preparation	SIC 10, 11, 12, 13, 14 (HHFA-BPR 85 similar)
19 Other not elsewhere classified	HHFA-BPR 89
2–3. *Processing Activities* (including refining, fabricating, assembly, storage, parking, and other space uses incidental to these activities)	SIC 2–3 (manufacturing) (HHFA-BPR 2–3 similar except for items in parentheses below)
20 Food and kindred products	(HHFA-BPR 21)
21 Tobacco products	(HHFA-BPR 396)
22 Textile mill products	
23 Apparel and other finished products made from fabrics and similar materials	(HHFA-BPR 23 except 236)
24 Lumber and wood products, except furniture	
25 Furniture and fixtures	
26 Paper and allied products	
27 Printing, publishing, and allied industries	
28 Chemicals and allied products	
29 Petroleum refining and related industries	
30 Rubber and miscellaneous plastics products	(HHFA-BPR 31)
31 Leather and leather products	(HHFA-BPR 236)
32 Stone, clay, and glass products	
33 Primary metals industries	
34 Fabricated metal products, except ordnance, machinery, and transportation equipment	
35 Machinery, except electrical	(HHFA-BPR 342)
36 Electrical machinery, equipment, and supplies	(HHFA-BPR 343)
37 Transportation equipment	(HHFA-BPR 344)
38 Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks	(HHFA-BPR 35)
39 Miscellaneous manufacturing industries, including ordnance, construction, and related activities	SIC 15–17, 19, 39 (HHFA-BPR 39, 341, 66 similar)
4. *Transportation, Communications, and Utilities Activities* (including related rights-of-way, storage, service, parking, and other areas incidental to these activities)	HHFA-BPR 4 (Transportation, communications, and utilities)
40 Railroad transportation and related transfer and maintenance facilities	Modification of SIC 40 (HHFA-BPR 411, 419 in part)
41 Local passenger systems and related maintenance, including terminals for cross-country stage lines but not including commuter lines operated over railroad rights-of-way and not including highway rights-of-way	Modification of SIC 41 (HHFA-BPR 412, 419 in part, 421, 429)
42 Motor freight transportation and related transfer and maintenance facilities	Modification of SIC 42 (HHFA-BPR 422 similar)
43 Highways and related maintenance facilities	HHFA-BPR 45
44 Water transportation and related transfer and maintenance facilities	SIC 44 (HHFA-BPR 44 similar)

General Activity System and Two-Digit Land Use Coding System[a]	Equivalent Codes under SIC or HHFA-BPR Systems[b]
45 Air transportation and related terminal transfer and maintenance facilities including landing areas and incidental space reservation (excluding military)	Modification of SIC 45 (HHFA-BPR 43 similar)
46 Pipeline transportation and related transfer, tank farm, and maintenance facilities	SIC 46 and 5092 (HHFA-BPR 491 similar)
48 Other communications and related transfer and maintenance facilities including telephone, telegraph, radio, television, and post office	SIC 43, 48 (HHFA-BPR 47, 673)
49 Electric, gas, water, and waste disposal services, including processing and storage, rights-of-way, and related facilities	SIC 49 (HHFA-BPR 48 similar)
5. *Distribution Activities* (including customer or employee parking, loading, service, and other related areas)	HHFA-BPR 5 (Trade)
50 Wholesale trade—*with storage on premises* (includes merchant wholesalers, wholesale and industrial distributors, manufacturers' sales branches and wholesale assemblers, and other warehousing functions involving storage on premises, except stockpiling under Activity Systems 1, 2, 3, 4 above)	SIC 50 not included under 51 below (HHFA-BPR 51 with auxiliary code of 0 similar[c])
51 Wholesale trade—*without storage on premises* (includes wholesale agents and brokers, manufacturers' sales offices and representatives, and freight forwarders)	SIC 50 not included under 50 above (HHFA-BPR 51 with auxiliary code of 1 or 2 similar[c])
52 Retail trade—building materials, hardware, and farm equipment	SIC 52 or HHFA-BPR 52
53 Retail trade—general merchandise	SIC 53 or HHFA-BPR 53
54 Retail trade—food	SIC 54 or HHFA-BPR 54
55 Retail trade—automotive dealers, auto accessories, and gasoline service stations	SIC 55 or HHFA-BPR 55
56 Retail trade—apparel and accessories	SIC 56 or HHFA-BPR 56
57 Retail trade—furniture, home furnishings, and equipment	SIC 57 or HHFA-BPR 57
58 Retail trade—eating and drinking places	SIC 58 or HHFA-BPR 58
59 Retail trade—miscellaneous retail stores	SIC 59 or HHFA-BPR 59
6. *Service Activities* (including customer or employee parking, loading, service, and other related areas)	HHFA-BPR 6 (Services in part)
60 Firm headquarters not located in conjunction with Activity Systems 1, 2, 3, 4, and 5 above	HHFA-BPR auxiliary code 1[c] (parts of SIC 1–5)
61 Finance, insurance, and real estate	SIC 6 (HHFA-BPR 61 similar)
62 Personal services	SIC 72 or HHFA-BPR 62
63 Miscellaneous business services	SIC 73 or HHFA-BPR 63
64 Automobile repair and services, metered or fee parking lots and garages	SIC 75 (HHFA-BPR 641, 46 in part similar)
65 Miscellaneous repair services	SIC 76 (HHFA-BPR 649 in part similar)
66 Commercial amusement services	SIC 78, 791–793 (HHFA-BPR 721, 7312, 739 in part similar)
67 Hotels, motels, trailer parks	SIC 701, 7031, 7042 (HHFA-BPR 15 similar)
68 Medical and health services except hospitals, sanatoriums, convalescent and rest homes	SIC 801–804, 807 (HHFA-BPR 651 except 6513, 6516)
69 Other professional services including professional associations, labor unions, etc.	SIC 81, 861–863, 89 (HHFA-BPR 652, 659, 683, 699 in part similar)

General Activity System and Two-Digit Land Use Coding System[a]	Equivalent Codes under SIC or HHFA-BPR Systems[b]
7. *Human Development, Recreation, and Public Service Activities* (including parking, service, and other related areas)	HHFA-BPR 6, 7 (Services; cultural, entertainment, and recreation in part)
70 Education, including parochial schools	SIC 821, 822, 824, 829, part of 866 (HHFA-BPR 681, 682)
71 Libraries, museums, art galleries, historical sites, arboretums, botanical gardens, etc.	SIC 84, 823 (HHFA-BPR 71 similar)
72 Recreation not elsewhere classified, including playgrounds, parks, and related open space; golf courses, country clubs, riding academies, winter sports areas; auditoriums, stadiums, race tracks, fairgrounds; outdoor water recreation; hunting and fishing preserves and summer camps	HHFA-BPR 722, 723, 729, 7311, 74, 75, 76 (SIC 7032, 794, parts of 91–93 similar)
73 Churches and other religious services	SIC 866 not included under 70 and 74 and 6551 (HHFA-BPR 691 similar)
74 Hospitals, sanatoriums, convalescent and rest homes	SIC 806, 809, part of 866 (HHFA-BPR 6513, 6516 similar)
75 Protective services—military and civilian, including police, fire, correctional, institutions, etc.	HHFA-BPR 672, 674, 675 (parts of SIC 91–94 similar)
76 Governmental services not elsewhere classified—city, county, state, federal, and other domestic or foreign headquarters or offices	HHFA-BPR 671 (parts of SIC 91–94 not included under 48, 70–72, 74, 75 similar)
77 Service and welfare organizations and their headquarters—Council of Social Agencies, Red Cross, Salvation Army, Boy Scouts, etc.	HHFA-BPR 692 (SIC 867 similar)
78 Nonprofit membership groups such as patriotic, veterans, fraternal, civic, and political organizations	SIC 864, 865 or HHFA-BPR 699
79 Other institutionalized services not elsewhere classified	(parts of HHFA-BPR 699 similar)
8. *Residential Activities*—nontransient space for housing	HHFA-BPR 1 (SIC 702, 704, 88 similar)
9. *No Activity*—unused space (improved and unimproved land, water areas, etc.)	HHFA-BPR 9 (Undeveloped land, water area)

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[a] The italicized headings correspond to the general activity systems identified in Chapter 7; items listed in roman type correspond to commonly used land use categories, grouped here the way they are for coding purposes. Obviously certain compromises are made in order for the system to conform to SIC categories important to planning analyses for the access they insure the analyst to standard sources of census statistics. This general coding system can be extended into three- and four-digit categories by reference to other systems indicated in the right-hand column.

[b] For SIC codes, see U.S. Office of Management and Budget (1972); and for the HHFA-BPR system of codes, see U.S. Urban Renewal Administration and U.S. Bureau of Public Roads (1965).

[c] The HHFA-BPR system has introduced a one-digit "auxiliary" series of categories to show a link between certain auxiliary functions and their parent functions: 0—not an auxiliary; 1—central or administrative office; 2—sales office; 3—research and development laboratory; 4—warehousing and storage; 5—automobile parking; 6—steam and power plant; 7—vehicle garage (maintenance and storage of vehicles); 8–9—(open codes).

Source: Chapin and Kaiser (1979) pp244 -247

Appendix 2

Estimated Floor Space Occupied by Each Functional Category in Functional Areas
1966

Function	Boyle Street Area	Civic Centre	Wholesale Warehouse Area	Provincial Govt Centre	McKay Avenue Area	CBD Commercial Core	CBD West Extension	Central Business District	Whole Central Area
1	12700	10800	26000	11500	0	94000	15000	104000	170000
2	200	0	500	9500	1500	43800	12000	60000	67500
3	13500	49000	27500	12000	5500	67700	43500	164200	218700
4	1000	1200	23000	14000	4000	36000	37000	82700	116200
5	0	37400	14000	154300	0	15300	0	3000	221000
6	6600	8500	1000	89000	15000	24800	6000	30800	150900
7	8900	9100	37500	11300	0	47400	51800	94700	166000
8	0	14600	2500	0	1000	13000	500	500	31600
9	18400	36500	27500	27000	77500	6200	15500	29800	208600
10	1800	3400	106500	0	0	12800	5500	15500	130000
11	1400	3000	12500	0	0	4000	0	6500	20900
12	800	6700	1500	6500	1000	8800	3000	9800	28300
total	65300	180200	280000	335100	105500	373800	189800	601500	1529700

Source: Land Use Maps, 1966

Appendix 3

Estimated Floor Space Occupied by Each Functional Category in Functional Areas
1971

Function	Boyle Street Area	Civic Centre	Wholesale Warehouse Area	Provincial Govt Centre	McKay Avenue Area	CBD Commercial Core	CBD West Extension	Central Business District	Whole Central Area
1	14100	7700	35000	8300	0	86300	21000	99500	172400
2	600	0	1000	12500	0	38700	7000	57000	59800
3	12400	51700	35300	22300	4000	69400	55000	168900	250100
4	1100	0	18000	7500	2000	111700	26500	137000	166800
5	0	27400	18000	190300	4500	27200	5000	16500	272400
6	7100	36300	25000	85500	16500	22800	2000	21800	195200
7	10400	22300	47300	17300	5300	64300	67500	114900	234400
8	700	15400	12500	500	0	21000	0	6900	50100
9	13300	30100	21500	15500	117000	2200	13500	18100	213100
10	1000	600	52300	0	0	6200	6000	3500	66100
11	0	300	8500	0	0	1300	0	4300	10100
12	0	1600	12000	2000	1000	6100	0	3200	22700
total	60700	193400	286400	361700	150300	457200	203500	651600	1713200

Source: Land Use Maps, 1971

Appendix 4

Estimated Floor Space Occupied by Each Functional Category in Functional Areas
1976

Function	Boyle Street Area	Civic Centre	Wholesal Warehouse Area	Provincial Govt Centre	McKay Avenue Area	CBD Commercial Core	CBD West Extension	Central Business District	Whole Central Area
1	14000	6300	43000	8000	2000	83400	22500	110200	179200
2	500	1200	2500	10500	1000	85600	12000	103100	113300
3	13100	71400	29000	18000	4000	102800	68500	239900	306800
4	0	0	13500	2000	0	149400	31500	181900	196400
5	0	48200	19000	253300	11000	17000	500	23500	349000
6	7200	35100	24500	87000	28000	21800	2500	28300	206100
7	14000	27300	60000	6000	7500	97200	60800	156500	272800
8	0	15400	12500	500	0	28500	4000	4500	60900
9	8700	64800	13500	4000	130500	18000	8000	48400	247500
10	700	0	42000	0	0	6000	3500	9000	52200
11	0	0	8500	0	0	500	0	0	9000
12	2800	3200	15000	13500	2000	10500	1000	26000	48000
total	61000	272900	283000	402800	186000	620700	214800	931300	2041200

Source: Land Use Maps, 1976

Appendix 5

Estimated Floor Space Occupied by Each Functional Category in Functional Areas
1981

Function	Boyle Street Area	Civic Centre	Wholesale Warehouse Area	Provincial Govt Centre	McKay Avenue Area	CBD Commercial Core	CBD West Extension	Central Business District	Whole Central Area
1	14100	4500	45300	7800	3300	115800	13000	134700	203800
2	0	1700	4000	9300	1000	104600	40500	145100	161100
3	8000	68100	40000	15000	4000	191700	66000	355100	392800
4	1700	4900	20300	21500	0	203600	62000	272000	314000
5	0	59300	18500	310000	21000	12000	1000	13000	421800
6	8400	52400	24500	93000	30500	20900	6500	27400	236200
7	14400	18800	72800	9000	6000	113000	64500	167700	298500
8	0	16100	27000	1500	0	25500	3000	28000	73100
9	10300	62500	55500	1500	140000	0	5000	41400	274800
10	0	0	21500	0	0	7000	500	3500	29000
11	0	0	5000	0	0	1000	0	1000	6000
12	3700	22400	23000	7500	7000	29400	45000	69400	138000
total	60600	310700	357400	476100	212800	824500	307000	1258300	2549100

Source: Land Use Maps, 1981

Appendix 6

Estimated Floor Space Occupied by Each Functional Category in Functional Areas
1986

Function	Boyle Street Area	Civic Centre	Wholesale Warehouse Area	Provincial Govt Centre	McKay Avenue Area	CBD Commercial Core	CBD West Extension	Central Business District	Whole Central Area
1	16100	3400	47000	10500	2700	109600	14500	124100	203800
2	0	3100	500	12000	0	174500	43500	218000	233600
3	8900	49600	43500	17000	12000	417300	124000	541300	672300
4	300	0	12000	1000	0	235700	48500	284200	297500
5	0	180900	64000	415300	13500	49600	47500	97100	770800
6	5700	34000	28000	106500	15000	30200	5500	35700	224900
7	20800	14300	90000	6000	6800	98600	59300	157900	295800
8	0	16100	14000	37700	0	20000	500	20500	88300
9	6200	61400	59500	0	136700	0	6500	6500	269300
10	300	0	12500	0	0	3000	0	3000	15800
11	0	0	1500	0	0	1000	1000	2000	3500
12	5100	47100	26500	1000	6500	38400	7500	45900	123100
total	62400	409900	399000	607000	193200	1177900	358300	1536200	3207700

Source: Land Use Maps, 1986

(Numbers in Appendices 2-6 are in square metres)